Contributions à l' économie de la famille : effet du statut marital sur le comportement des ménages.

Imen Hentati

Université Cergy-Pontoise & Université de Tunis

THÈSE

Pour l'obtention du grade de docteur en Sciences Économiques

Soutenue publiquement le 23 février 2015 par :

Imen Hentati

Contributions à l'économie de la famille : effet du statut marital sur le comportement des ménages

Jury :

Directeurs :	Olivier DONNI	Université Cergy-Pontoise
	Adel KARAA	Université de Tunis
Rapporteurs :	Olivier BARGAIN	Université d'Aix-Marseille
	Mohamed Safouane BEN AISSA	Université Tunis El Manar
Examinateurs :	François GARDES	Université Paris I
	Anne SOLAZ	INED
Président :	Olivier BARGAIN	Université d'Aix-Marseille

L'université Cergy-Pontoise et l'université de Tunis n'entendent donner aucune approbation ni improbation aux opinions émises dans les thèses : ces opinions doivent être considérées comme propres à leurs auteurs.

Remerciement

Avant d'entrer dans le vif du sujet, je souhaite, par ces quelques lignes, exprimer ma reconnaissance envers les personnes qui ont le plus contribué à l'élaboration de cette thèse.

Toute ma gratitude en direction de mes directeurs de thèse, Olivier Donni et Adel Karaa, qui ont su me guider durant ce long parcours. Tous les chapitres de cette thèse doivent à leurs encouragements et à leurs critiques.

Je remercie également les membres du jury, pour avoir accepter donner leurs commentaires sur une version préliminaire de cette thèse, en espérant que le travail réalisé soit à la hauteur de leurs attentes.

Je tiens ensuite à remercier Bernard Fortin, dont l'enthousiasme et la clairvoyance ont toujours été pour moi de la plus grande utilité depuis mes études de Master à l'université de LAVAL.

Merci aux chercheurs et enseignants de l'Intitut Supérieur de Gestion de Tunis, de la Faculté des Sciences Économiques et de Gestion de Tunis et enfin de l'Université Cergy-Pontoise qui se sont intéressés de près ou de loin à ce travail de recherche.

Merci ensuite au Ministère de l'Enseignement Supérieur de Tunisie qui m'ont bénificié d'une bourse lors de mon séjour à Paris.

Finalement, je ne saurais en quelques lignes exprimer toute l'affection que j'éprouve pour ma famille, en particulier à mes parents, mon mari et mon fils, et les regrets de ne pas leur avoir consacré suffisamment de temps. Cette thèse leur est dédiée.

Table des matières

Liste des tableaux

Table des figures

Chapitre 1

Introduction générale

"It is argued that marriage is no exception and can be successfully analyzed within the framework provided by modern economics. If correct, this is compelling additional evidence on the unifying power of economic analysis"

G.S. Becker. 1978

La famille constitue un terrain de recherche considérable pour certaines disciplines scientifiques comme la psychologie, la sociologie ou l'anthropologie. Les économistes sont venus plus tard apporter leur contribution à la connaissance des phénomènes familiaux et démographiques. Néanmoins, la famille est devenue un sujet d'étude à part entière en économie suite aux travaux de Gary Becker à partir des années 1960. Avec la publication de "Treatise on the Family", le mariage, le divorce et la fécondité sont devenus des variables à expliquer par la science économique au même titre que le chômage ou l'inflation. Le champ de l'économie de la famille se focalise notamment sur deux types de questions : quels sont les déterminants du marché de mariage et comment s'effectuent les prises de décision une fois le couple est formé ? La théorie de mariage étudie la famille sous plusieurs angles : la division du travail, la consommation jointe, le choix

du conjoint, le partage du risque, etc. Ces problématiques générales en amènent beaucoup d'autres et l'approche choisie par les économistes dépend fortement du contexte dans lequel ils se situent. En effet, Becker a mis en avant la croissance rapide du taux de divorce comme principal bouleversement de la famille. De même l'apparition d'une nouvelle structure familiale dans laquelle le rôle des individualités est plus fort (concubinage) peut affecter le comportement du ménage.

La théorie néoclassique d'une façon générale et les modèles théoriques de Becker en particulier, se basent souvent sur l'hypothèse du "ménage unitaire". Ce cadre d'analyse qui convient à l'étude d'entités individuelles ne prend pas en compte la pluralité des décideurs à l'intérieur d'un groupe de personnes comme le ménage. Plus spécifiquement, la fonction d'utilité du ménage est unique et les préférences individuelles sont agrégées en un système de préférences sociales. Cette hypothèse a le mérite de simplifier considèrablement le comportement du ménage et de permettre la mise en place de tests empiriques rigoureux. Le défaut, inhérent à toute hypothèse, est de rendre restrictives certaines modélisations. Il est en effet diffcile d'étudier des problèmatiques telles que l'inégalité au sein du ménage ou le coût des enfants à partir de cette hypothèse. Confortés par le manque de support empirique et l'absence de fondements théoriques, certains auteurs ont développé des modèles de ménages collectifs. Le principe de base de ces modèles est de caractériser les préférences de chaque individu. À partir de ce principe fondateur, plusieurs courants ont émergé. Ils divergent par les mécanismes utilisés pour comprendre la prise de décision au sein du ménage. On peut distinguer deux types de modèles : les modèles non-coopératifs et les modèles coopératifs. Les premiers sont basés sur des équilibres de Cournot-Nash tandis que les seconds prennent pour hypothèse une allocation Pareto efficiente. Récemment, cette seconde catégorie de modèle a connu d'importantes avancées théoriques dans plusieurs directions : identification des préférences individuelles dans le processus de décision ainsi que la modélisation des échelles d'équivalence.

Cette thèse est inspirée des développements récents des modèles de comportement du ménage. Ainsi, et après un bref rappel de la théorie de mariage, cette introduction met en évidence l'évolution des outils théoriques de la décision intra-familiale. Ainsi nous reviendrons sur les insuffisances de l'approche unitaire. Puis, nous abordons les deux grandes tendances des approches collectives (coopérative et non-coopérative). Un résumé de la thèse sera ensuite détaillé au niveau de chaque chapitre.

1.1 Le théorie de mariage

Aucun économiste ne prétend que les aspects économiques sont les seuls, ni même les principaux éléments intervenant sur le marché du mariage. Mais les apports des économistes sont loin d'être négligeables et ont été souvent intégrés dans plusieurs champs disciplinaires. Becker a été parmi les premiers à modéliser la notion de capital humain. Ses travaux sur la théorie de mariage ont été à la base du développement de l'analyse économique du mariage, en influençant à la fois juristes et économistes. Ses travaux ont débouché sur une meilleure modélisation des comportements humains dans une optique de rationalité. La théorie du mariage se divise en plusieurs parties. Tout d'abord chaque individu décide de se marier si son utilité espérée est supérieure à celle de rester célibataire. Être marié ou célibataire ne reflette pas une réalité juridique, mais plutôt un comprotement rationnel des agents économique (Browning, Chiappori and Weiss, 2009). Le deuxième problème concerne l'explication du choix des partenaires. Selon Becker, le mariage est une affectation volontaire d'un homme à une femme. Sous l'hypothèse "d'utilité transférable", l'équilibre du marché du mariage repose sur la maximisation de la production de l'ensemble des ménages mariés, parmi toutes les possibilités de marriages. En relâchant cette hypothèse, l'équilibre du marché est déterminé par l'appréciation des caractéristiques individuelles du partenaire retenu. Enfin, l'analyse économique de la famille explique l'évolution de cette institution par l'évolution de ses coûts et de ses bénéfices. La recrudescence des divorces, ainsi que

la montée du nombre de familles concubines est profondément liée à l'évolution des contraintes économiques que subissaient les individus. Cette section est consacrée à une rapide présentation de ces trois axes.

1.1.1 Les raisons économiques du mariage

La famille est une entreprise ou une communauté d'intérêts qui offre à ses membres des bénéfices de toutes sortes qu'il est difficile de se procurer à un prix raisonnable sur le marché. Ces bénéfices peuvent être au niveau de la production tels que la division du travail, au niveau de la consommation tels que les économies d'échelles ou même au niveau du partage du risque.

1.1.1.1 Gains liés à la production : La division du travail

Si chaque membre de la famille dispose d'un avantage comparatif dans une activité, une division du travail entre eux permettra de produire plus ensemble que séparément. C'était l'un des principaux avantages de la famille mis en avant par Becker (1981), qui se fonde sur la répartition des tâches de la famille traditionnelle dans laquelle chacun peut se servir de son capital à une plus large échelle. Par exemple, une femme peut se spécialiser dans le capital domestique et le mari construire sa carrière professionnelle. Que ce soit sur le marché ou à la maison, le capital humain est d'autant plus utile qu'il est utilisé intensivement. Il y a diverses preuves de la division du travail au sein des ménages. Les hommes mariés travaillent de longues heures sur le marché et ont des salaires substantiellement plus élevés que ceux des hommes non mariés. Les femmes mariées ont des salaires plus faibles et travaillent plus à la maison que les femmes célibataires (Gronau, 1987 ; Korenman-Newmark, 1992 et Daniel, 1992). Pour expliquer cette orientation sexuée de la spécialisation, Becker (1981) affirme que les rôles domestiques des hommes et des femmes ne sont pas interchangeables pour des raisons

biologiques liées à la maternité.

Toutefois, pour Sen (1990), les conceptions des rôles de la femme et de l'homme dépendent de la nature de la "technologie sociale", c'est-à-dire de l'organisation sociale en vigueur (Sen, 1990, p. 129-130). La division du travail entre les sexes relève de constructions sociales et non de dispositions déterminées biologiquement. La "technologie sociale", qui prévaut à un moment donné dans un pays, peut perpétuer les asymétries entre hommes et femmes et les inégalités de genre en faisant apparaître comme naturelle et invariable la division sexuée du travail (l'homme chef de famille, principal apporteur de revenu et la femme au foyer ou active mais avec un salaire d'appoint). Pollak (1994), l'un des artisans des modèles de négociations, reconnaît que le mérite de la critique de Sen est d'avoir montré que les institutions, les pratiques, les normes sociales et les rôles "convenus" attribués aux hommes et aux femmes sont en réalité endogènes et influent sur le "jeu" d'un ménage donné, même si cette critique est de nature qualitative et ne permet vraisemblablement pas de réaliser des tests empiriques.

Le partage des rôles et des tâches est différencié selon les sexes mais aussi selon les pays . Par exemple, la répartition sexuelle des tâches domestiques est plus inégalitaire en France qu'en Suède : 41% des hommes en couple participent aux activités domestiques du ménage en Suède contre 32% en France. Par ailleurs, l'écart du temps consacré par les hommes et les femmes au travail domestique est plus réduit en Suède qu'en France (Anxo, Flood, Kocoglu 2002, p. 138). Ces résultats sont à relier au cadre institutionnel et sociétal différencié dans les deux pays et, d'une manière plus générale, aux relations entre l'Etat, la famille et le marché. Une autre composante qui peut affecter les usages du temps au sein du couple, est le "type de contrat marital" entre les sexes. En utilisant les données du "German Socio-Economic Panel", El Lahga et Moreau (2007), montrent que le passage du statut concubin au statut marié peut influencer le nombre d'heures affectés au travail domestique et marchand au sein des couples : les résultats montrent que le mariage renforce le degré de spécialisation des femmes au travail domestique[1].

1. Outre que la division du travail, le couple peut aussi produire des biens qui ne peuvent pas être

1.1.1.2 Gains liés à la consommation : Fourniture des biens collectifs et économies d'échelle

L'économiste Paul Samuelson établit une classification entre les biens, distinguant biens privés et biens publics. La rivalité et l'exclusion sont les deux principes sur lesquels s'appuie cette taxinomie : la rivalité est un principe en vertu duquel la consommation d'un bien par un agent diminue la quantité disponible de ce même bien par un autre agent ; l'exclusion conduit à écarter de la consommation d'un bien un individu, qui ne pourrait pas ou ne voudrait pas payer, pour jouir de la consommation de ce bien. Un bien privé répond à ces deux principes, contrairement au bien public pur. Par conséquent, les gains de la mise en couple proviennent de l'existence des biens publics et semi-publics [2]. Les dépenses pour enfants, le logement et le chauffage en constituent probablement les meilleurs exemples. Si tous les biens à l'intérieur du ménage sont collectifs, les gains dus au mariage sont manifestes. En mettant en commun leurs consommations collectives, les ménages composés de plusieurs personnes réalisent des économies d'échelles par rapport aux personnes célibataires. À niveau de vie identique, les dépenses d'un ménage de taille "N" sont ainsi inférieures à "N" fois des dépenses d'une personne seule. L'échelle d'équivalence associé au ménage de taille "N" se définit comme le rapport entre les dépenses d'un ménage de "N" personnes et les dépenses d'une personne seule , à niveau de vie fixé. De ce fait, plus les biens collectifs représentent une part importante de la consommation des ménages, plus les économies d'échelle sont importantes et plus l'echelle d'équivalence est faible.

Dans la littérature économique, les échelles d'équivalence souffrent d'un problème important quant à leur construction. Selon Browning (1989) et Blundell et Lewbel (1991), les échelles d'équivalence sont fondamentalement non identifiables en utilisant

produits seuls : les enfants.

2. En pratique, la plus part des consommations sont intermédiaires entre l'individuel et le collectif. C'est l'usage d'un produit qui détermine, en fait, sa nature. Selon leur usage dans le ménage, les différents produits peuvent s'ordonner sur un axe opposant les biens collectifs aux biens individuels.

seulement les dépenses de consommation puisqu'on est confronté au problème classique de comparaison interpersonnelle d'utilité. Pour calculer les échelles d'équivalence, il est nécessaire de faire une hypothèse ad-hoc non testable, qui reflète en fait un choix normatif du chercheur. Historiquement, Engel a fait recours aux dépenses alimentaires pour comparer des niveaux de bien être en partant de son observation de la concavité des courbes d'expansion du revenu. Pour lui, les ménages ayant la même part de dépenses alimentaires avaient le même niveau de vie. Alternativement, Rothbard (1943) a utilisé la part des vices (alcool, tabac, etc.) dans les dépenses pour comparer le niveau de bien être entre ménages. Depuis quelques années, l'usage est désormais d'utiliser une restriction "d'indépendance au choix de la base" pour identifier les échelles d'équivalence, ce qui revient à supposer que les échelles d'équivalence ne dépendent pas du revenu [3].

1.1.1.3 Partage du risque

Les gains attendus d'une assurance mutuelle peuvent être très importants. Par exemple, Kotlikoff et Spivak (1981) ont étudié les risques résultant de l'incertitude sur la durée de vie, en l'absence de système de retraite. Ils ont estimé que les gains qu'une personne seule peut espérer du mariage sont l'équivalent de 10 à 20% de sa richesse. De même, Rosenzweig et Stark (1989) ont montré que les mariages en Inde rurale sont arrangés entre des partenaires suffisamment éloignés pour que la corrélation entre les précipitations dans les deux lieux de résidence soit fortement réduite. La mise en couple (mariage ou concubinage) peut offrir aux conjoints un genre d'assurance, néanmoins, il y a une difference entre les deux types d'union : dans le mariage, les restrictions légales incitent les deux conjoints à partager le risque d'une manière plus effciente. Cependant pour les cohabitants, et en absence d'engagement, le partage du risque dépend du niveau d'altruisme entre les deux conjoints. Grâce à leur altruisme, les cohabitants choisissent volontairement de partager le risque alors que les mariés, et

3. Les développements récents des échelles d'équivalence seront présentés au niveau du chapitre suivant.

sous la pression des restrictions légales, sont obligés de partager le risque efficacement et de prendre soin les uns des autres même après le divorce. Nordlom (2004) propose un modèle où les couples mariés sont soumis à des restrictions légales qui les obligent à agir de façcon coopérative, tandis que les cohabitants, soumis à des engagements moraux, agissent d'une manière non-coopérative. Ses résultats empiriques montrent que le partage de risque est plus faible au niveau des cohabitants qu'au niveau des couples mariés.

1.1.2 Le marché de mariage

Être marié implique une perte d'indépendance et rompre le mariage ne se fait pas sans coût. Si le mariage n'entraînait pas ces difficultés, chacun épouserait la première personne rencontrée. Néanmoins, le choix du conjoint et le partage des gains du mariage peuvent être analysés en termes de marché. Dans la littérature des appariements, deux grandes approches sont le plus souvent rencontrées. Ces deux approches se différencient essentiellement par l'existence ou non d'une utilité transférable à l'intérieur d'un mariage. Néanmoins, elles reposent toutes les deux sur un concept d'équilibre spécifique connu sous le nom de "stabilité". Formmellement, une "affectation" est dite stable si et seulement si : (i) II n'y a pas de personne mariée qui préférerait être célibataire et (ii) II n'y a pas deux personnes mariées ou non mariées qui préféreraient former une nouvelle union (Weiss, 1994).

1.1.2.1 Équilibre du marché avec utilité transférable

Les individus en société ont plusieurs partenaires possibles. Cette situation crée une concurrence sur les gains potentiels du mariage. Le principal intérêt de cette approche est de faire ressortir que la décision de former une union durable est prise par comparaison avec l'ensemble des choix possibles et non par l'appréciation des mérites

intrinsèques du partenaire retenu. Pour comparer les gains attachés à divers mariages possibles, il est utile de définir la mesure d'un produit qui caractérise le mariage. En général, on associe à chaque mariage un ensemble de décisions. Chaque décision a un résultat défini par des valeurs de l'utilité pour les deux partenaires. Cette simplification est possible lorsqu'il existe un bien qui, en changeant de mains, transfère l'utilité d'un partenaire à l'autre, à un taux d'échange fixe. L'information sur le produit attendu des divers mariages possibles suffit à la détermination d'un résultat d'équilibre. Ainsi, une affectation stable doit avoir un produit total supérieur à toutes les autres affectations possibles.

1.1.2.2 Équilibre du marché sans utilité transférable : l'algorithme de Gale-Shapeley

Dans certains cas, il n'y a pas de bien que le couple puisse transférer à l'intérieur du mariage. Un mariage génère alors un résultat pour chaque conjoint, pleinement déterminé par les caractéristiques individuelles de celui-ci. Ce résultat ne peut pas être modifié par un des conjoints avec une compensation pour l'autre, mais un mariage non désiré peut être désavoué ou remplacé par un meilleur. Il n'y a donc pas de possibilité d'un échange au sein d'un couple, mais on peut toujours changer de couple. Gale et Shapley (1962) ont suggéré l'algorithme suivant : chaque homme propose d'abord le mariage à la femme qu'il préfère. Une femme rejette toutes les offres qui ne sont pas préférables à l'état de célibat, et si elle en conserve ainsi plusieurs, elle rejette toutes les offres dominées et ne garde que les non dominées. Au tour suivant, chaque homme rejeté propose le mariage à la meilleure des femmes qui ne l'ont pas rejeté. Les femmes élimineront toutes les offres dominées. L'équilibre est atteint lors qu'il n'y a plus d'homme rejeté. L'objectif principal de Gale et Shapley est de définir un mécanisme d'appariement satisfaisant aux exigences de stabilité :

Gale et Shapley (1962) "*Dans tout modèle de mariage, quelles que soient les préférences des individus, il existe un appariement stable. Plus précisément, l'appariement résultant de l'algorithme d'acceptation differée, en faveur des hommes, est stable (et de même pour l'algorithme en faveur des femmes)*".

1.1.3 L'évolution du marché de mariage

L'approche économique de la famille interprète le mariage, le divorce et les relations familiales à travers le prisme du comportement de maximisation de l'utilité orientée vers le futur. L'hypothèse de base est que lorsque les conjoints décident de se mettre en couple, d'avoir des enfants ou de divorcer, ils cherchent à maximiser leurs utilités en comparant les avantages et les coûts. Donc, ils se mettent en couple s'ils espèrent vivre mieux qu'en restant célibataires, et ils divorcent s'ils espèrent améliorer leur bien-être. Le choix marital d'un couple (mariage ou concubinage) doit être lui même un choix rationnel puisqu'il pourrait être un élément clef dans toute prise de décision à l'intérieur du ménage.

1.1.3.1 Analyse économique du divorce

Becker était parmi les premiers qui s'est intéressé à l'analyse économique du divorce. L'idée de base est que la probabilité de divorce est inversement liée aux gains anticipés du mariage ainsi qu'à la variance de la distribution des gains non anticipés du mariage (Silber, 1981). Les auteurs se basent souvent sur la deuxième relation et indiquent que la majorité des divorces est lié à l'existence de cette incertitude. L'analyse du divorce copie, en fait, celle du mariage et les auteurs dérivent que les époux divorcent lorsque la somme des bénéfices nets anticipés au moment du divorce est supérieure à celle qu'ils prévoient au cas où le mariage continue. La probabilité de divorce dépend alors de plusieurs facteurs. Premièrement, la qualité de l'assortiment du couple, qui résulte du processus

de recherche d'un conjoint, peut affecter le gain au mariage. Deuxièmement, ce même processus de recherche puis la recherche d'informations dans le mariage contribuent à réduire l'incertitude associée aux utilités espérées. Ceci justifie le fait que la probabilité de divorcer est plus forte en début de mariage et pour les conjoints qui se marient jeunes. Troisièmement, l'accumulation de capital spécifique au mariage (c'est-à dire des investissements qui ne sont vraiment utiles que si les époux restent mariés) contribue à accroître le gain au mariage et donc à réduire la probabilité de divorcer. Selon Becker, le mariage aura moins de chance d'être dissous si les époux ont effectué des investissements spécifiques. Parmi ces investissements spécifiques il convient évidemment d'inclure les enfants. Enfin, la probabilité de divorce dépend du coût associé à cet événement : coûts psychologiques, coûts de procédures, coûts en termes de moindre retour sur investissement en capital spécifique au mariage. Comme ces coûts financiers et émotionnels sont assez élevés, il est probable que les gens opteraient pour un autre mode marital comme le concubinage plutôt que le mariage.

1.1.3.2 Le concubinage

À l'image de la société mouvante qu'est la société contemporaine, le modèle familial des populations s'est transformé. La peur de l'engagement et la libéralisation des mœurs ont favorisé l'émergence de nouvelles formes de vie à deux. Parmi ces formes d'union on note le concubinage. Si le mariage est une union solennelle entre un homme et une femme devant un officier d'état civil, le concubinage est une union de fait caractérisée par une vie commune présentant un caractère de stabilité et de continuité, entre deux personnes, de sexe différent ou non, qui vivent en couple [4]. Autrement dit, deux personnes vivant ensemble sans être ni mariées ni soumises à un pacte civil de solidarité sont considérées comme vivant en concubinage.

4. Article 515-8 du Code civil Français.

Le concubinage est souvent perçu comme impliquant moins de responsabilités aux niveaux légal, économique, voire émotionnel (Bumpass et al., 1991). En conséquence, c'est une relation plus facile à rompre que le mariage, en particulier quand il n'y a pas d'enfants. Récemment, les conjoints de fait, en Europe du Nord et Amérique du Nord, ont demandé et obtenu des droits similaires à ceux des couples mariés aux niveaux de la propriété, de l'assurance-santé, des régimes de retraite et de la pension alimentaire, néanmoins, l'union libre demeure moins institutionnalisée que le mariage. Ce manque de normes signifie que les conjoints pourraient commencer à cohabiter en ayant des attentes très différentes concernant la permanence, la coopération et la mise en commun des ressources financières par exemple. Ceci peut éventuellement affecter la disribution des ressources intra ménage et diminuer le niveau du bien être des enfants. À l'inverse, on s'attend à ce que la coopération et la mise en commun des ressources financières interviennent pendant le mariage.

Bien que l'union libre obéisse moins aux restrictions légales et émotinnelles, nombreux sont les couples qui ont choisi de commencer leur union dans un cadre hors mariage. En effet, au Canada, le taux de mariage a atteint un pic à 10,6 par 1 000 habitants en 1941 avant de régresser à 7,1 par 1 000 habitants en 1990, puis à 5,0 par 1 000 habitants en 2001. Cette baisse continue du taux de mariage au Canada est confrontée à une augmentation importante du taux de cohabitation qui a atteint 16 % en 2001. Aux États-Unis, le taux de mariage a bondi après la Grande Crise, atteint en 1946 un pic de 16,4 par 1 000 habitants. Il a fluctué depuis dans une tendance baissière pour s'établir à 8,9 mariages par 1 000 habitants en 1996 (U.S. Bureau of the Census, 1997). Le marché de mariage au Royaume-Uni n'est pas épargné du phénomène. En effet, selon les statistiques de l'office national en 2006, 2.3 millions de couples vivent en concubinage[5]. Plus qu'un tiers (36 %) du public en Angleterre et le Pays de galles avaient été dans une relation de cohabitation à quelque temps. En 2005, 39 % des individus célibataires, âgés entre 25 et 34 ans, ont choisi le concubinage comme cadre

5. Sources : Focus on Families 2007, Office for National Statistics ; British Social Attitudes Report 2007/2008, National Centre for Social Research.

Pays	Année	Proportion de cohabitation en %
Grande Bretagne	2006	36
Suède	2000	30
Norvège	2000	24.5
Finlande	2000	18.5
Mexique	2000	18.7
Nouvelle-Zélande	2001	18.3
France	1999	17.5
Canada	2001	16
Etats-Unis	2000	8.2
Source : Statistique Canada, 2002 et ONS, 2007.		

TABLE 1.1 – Proportion des couples vivant en union libre

de leur première union. Pour ceux qui sont âgés entre 35 et 49 ans la proportion est égale à 30 %. Le taux de cohabitation au Royaume-Uni est en croissance continue. En effet, entre 1996 et 2006, le nombre de couples concubins a augmenté de 60% pour atteindre 2.3 millions couples concubins. Selon les privisions de l'office national, ce nombre est estimé à atteindre les 3.8 millions de couples (presque le double) en 2031 [6]. La majorité des jeunes Britanniques commencent leur première union dans le cadre d'une union libre. C'est généralement dans une telle union que naît le premier enfant. Cependant, plus tard et en particulier après la naissance des enfants, une partie des couples finissent par se marier. En conséquence, au moins à court terme dans le cycle de vie des jeunes couples, l'union libre reporte le mariage (Wu, 1999).

6. Sources : Cohabitation : The Financial Consequences of Relationship Breakdown, Law Commission No307 ; Focus on Families 2007 ; National Statistics Online February 2009 - Focus on Families - Overview of Families ; National Statistics Population Trends No121 Autumn 2005.

1.2 Les décisions intra du ménage : théories

La théorie du consommateur dote l'agent d'une fonction d'utilité qu'il maximise sous sa contrainte budgétaire. C'est ce que l'on appelle "la rationalité individuelle". Replacé dans son contexte familial, l'agent est amené à prendre des décisions qui auront une influence sur le comportement de ses partenaires et réciproquement. D'où le problème de la prise en compte de la possible pluralité des centres de décision au sein du ménage. Une première réponse a été apportée. Elle consiste à agréger les préférences individuelles en un système de préférences sociales. C'est ce cadre théorique que nous qualifions d'approche "unitaire". Cette manière de procéder, tout en étant très simple, permet d'effectuer des tests empiriques rigoureux, de retrouver les préférences du ménage de manière non-ambigue et d'interpréter les résultats empiriques dans la perspective d'évaluer l'impact sur le comportement du ménage des politiques économiques. Ces commodités expliquent largement le succès que cette approche rencontre depuis plusieurs décennies.

Cependant, un cadre d'analyse qui ne prend pas en compte la pluralité des décideurs dans le ménage révèle certaines insuffisances. D'un point de vue méthodologique, les économistes ont tenté de donner des fondements microéconomiques au modèle unitaire (Samuelson, 1956, Becker, 1974, 1991), cependant, les conditions sous lesquelles les préférences individuelles peuvent s'agréger sous la forme d'une fonction d'utilité sociale consensuelle ou se référer à la fonction d'utilité d'un chef de ménage dictateur altruiste sont hautement restrectives (Bergstrom, 1989). D'un point de vue empirique, les restrictions induites par le modèle unitaire , tel que la propriété de mise en commun des ressources (ou "income pooling") ainsi que les propriétés de symétrie et de semi-définie négativité de la matrice de Slutsky, ont été largement rejetées, mettant en cause sa validité théorique et empirique.

Devant un manque de support empirique et l'absence de fondements théoriques de l'approche unitaire, de nouveaux modèles sont apparus que nous qualifierons d'ap-

proches "pluri-décisionnelles" de la famille. Ils ont en commun d'affecter à chaque personne sa propre fonction d'utilité et de tenir compte expressément la pluralité des sources de décision au sein du ménage. En revanche, ces approches se répartissent en deux grandes catégories, selon l'hypothèse faite sur la nature du processus de décision à l'intérieur du ménage. Les modèles non-coopératifs utilisent la notion d'équilibre de Cournot-Nash. En d'autres termes, chaque agent dans le ménage est supposé maximiser son utilité, par rapport à sa propre contrainte budgétaire, en prenant les actions de son partenaire comme une donnée. Un inconvénient de ces modèles est qu'ils ne mènent pas nécessairement à des solutions qui sont efficaces au sens de Pareto. Les modèles coopératifs, au contraire, partent du postulat que le processus de décision, quel qu'il soit, mène à des solutions efficaces au sens de Pareto. Cette catégorie de modèles inclut, notamment, les modèles de comportement du ménage basés sur la théorie axiomatique de la négociation avec information symétrique (par exemple, les solutions de Nash ou de Kalai-Smorodinsky). Les travaux réalisés dans cette direction dès la fin des années 80 constituent une avancée importante vers la reconnaissance du rôle des rapports de force dans les décisions intra-familiales.

Les modèles à rationnalité collective, ou modèles "collectifs", reposent sur un principe élémentaire, à savoir la Pareto-efficience de la décision intrafamiliale (Chiappori, 1988, Browning et Chiappori, 1998, Vermeulen, 2002 et Chiappori et Donni, 2004). La notion de "règle de partage" est sans doute la clef du succès de ces modèles. Cette notion est devenue si populaire que, parfois, elle devient le symbole de toute la littérature sur les modèles collectifs. L'idée est de décrire la répartition interne des ressources que les conjoints suivent implicitement quand ils choisissent une allocation Pareto-optimale particulière (Bourguignon et al,1995). D'une manière générale, la faiblesse du modèle collectif standard vient des difficultés de prise en compte des externalités dans les consommations, de biens ou de temps, à l'intérieur de la famille. En effet, les propriétés d'identification de la règle de partage peuvent difficilement être maintenues si l'on autorise toutes formes d'externalités intrafamiliales. Les développements récents du modèle collectif sont généralement orientés dans cette direction.

Ce chapitre, consacré à une rapide présentation de la modélisation des décisions intra-familiales, est organisé de la manière suivante. La section 2 revient sur les hypothèses du modèle unitaire et ses fondements microéconomiques. La section 3 présente les insuffisances de l'approche unitaire. La section 4 présente les approches collectives en terme de jeux, coopératifs et non-coopératifs, du processus de décision au sein des familles. Le modèle collectif, sa caractérisation générale et particulière font l'objet de la section 5. Ses développements récents et extensions sont présentés dans la section 6.

1.2.1 L'approche unitaire et ses fondations

La modélisation unitaire du comportement d'un ménage reste assez répandue. Cette approche utilitariste suggère qu'il existe un consensus entre les individus d'un même ménage quant au meilleur moyen de combiner leur temps, leur production et leur consommation, afin de maximiser leur bien-être commun. La question de l'agrégation des préférences individuelles est un problème qui ne dispose pas de solution générale. Néanmoins, les économistes ont cherché sous quelles conditions on pouvait l'imposer. Dans ce domaine, Paul Samuelson et Gary Becker ont laissé une trace souvent citée dans la littérature des modèles de choix intra-familiaux.

1.2.1.1 Le principe de consensus de Paul Samuelson

Dans son modèle du consensus, Samuelson rationalise le comportement familial sous la forme de la maximisation d'une fonction d'utilité unique. Selon lui, les membres du ménage, d'un commun accord, conviennent de maximiser une fonction commune de bien-être de leurs utilités individuelles distinctes, sous une contrainte budgétaire conjointe qui rassemble l'ensemble des revenus des membres du ménage. Dès lors, le ménage agit comme un décideur unique, avec une contrainte de budget commun unique et une fonction d'utilité représentative de la consommation et du loisir de tous les

membres. D'après Samuelson (1956), les fondements à l'utilisation d'une fonction d'utilité unique pour l'ensemble des membres du ménage relèvent d'une question similaire à l'élaboration d'une fonction de choix social à l'échelle d'un pays. Néanmoins, l'utilisation d'une telle fonction n'est pas toujours envisageable. Samuelson suppose qu'il est possible de modéliser les choix de plusieurs individus comme un seul décideur si et seulement si la fonction de choix social satisfait la condition de transfert optimal[7]. Bergstrom (1989) relève que pour des fonctions d'utilité transférable, la condition de transfert optimal reste toujours satisfaite ; en d'autres termes, étant donné un niveau de bien-être pour le ménage, les niveaux d'utilité individuels peuvent être redistribués.

Une faiblesse évidente de l'approche est que Samuelson ignore comment est édifié ce consensus sur la fonction commune de bien-être, de même que le processus par lequel il se maintient. Il semble pourtant évident que les intérêts des individus, alors que les ressources du ménage sont naturellement limitées, peuvent s'opposer.

1.2.1.2 Le modéle altruiste et le théorème de l'enfant gâté de Gary Becker

Pour Gary Becker (1974, 1991), la famille est constituée, à la base, d'un agent altruiste (le chef du ménage) et de un ou plusieurs agents égoistes (le conjoint du chef de ménage et leurs éventuels enfants). L'altruiste se définit comme prenant en compte de façon positive la fonction d'utilité des autres membres du ménage, au sein de sa fonction d'utilité. Ainsi, un chef de ménage altruiste prend en compte sa consommation d'un bien agrégé ainsi que la consommation des autres membres de ménage. Becker suppose que chaque membre du ménage va agir comme si il était effectivement altruiste envers les autres membres du ménage, même s'il ne l'est pas effectivement. La raison est que l'altruiste va ajuster ses transferts envers les membres égoistes de telle sorte que ceux-ci ne prennent pas d'actions susceptibles d'affecter le bien-être des autres membres du ménage. En conséquence, les individus égoistes vont tous agir de façon

7. Un transfert permettant la préservation des choix individuels et agrégés (Samuelson, 1956).

à maximiser le revenu familial ; une redistribution des revenus entre les membres du ménage ne va pas affecter les choix de consommation du chef de ménage. Gary Becker (1974) ajoute : "*Family's utility function is the same as that of one of its members not because this member has dictatorial power over other members, but because he (or she) cares sufficiently about all other members to transfer resources voluntarily to them. Each member can have complete freedom of action ; indeed, the person making the transfers would not change the consumption of any member even with dictatorial power*".

Néanmoins, le théorème de l'enfant gâté, d'apparence assez générale, est soumis à un certain nombre de limites. La plupart de ces limites sont liées au fait qu'un seul bien de consommation agrégé est pris en compte, ce qui simplifie considérablement le problème d'agrégation des préférences. Pour que le théorème de l'enfant gâté reste valide en présence de biens publics ou de consommations de différents biens, incluant éventuellement des désincitations liées à l'effort d'obtention de revenu individuel, Bergstrom (1989) démontre que l'utilité doit être transférable.

1.2.2 Les insuffisances de l'approche unitaire

Une première faiblesse des modèles traditionnels est d'ordre méthodologique. Comme le souligne Chiappori (1992), l'approche unitaire ne satisfait pas un des principes de base de l'analyse néo-classique, à savoir l'individualisme méthodologique. Selon ce principe, tous les modèles de l'économie doivent ou devraient trouver leur justification dans le comportement individuel des agents. Par conséquent, il est préférable, lorsque l'on modélise le comportement d'un ménage, de caractériser les individus par des préférences propres, plutôt que de les agréger dans une unité de décision collective. Il convient néanmoins de rappeler que le consensus de Samuelson et le théorème de Becker constituent deux exceptions notables des modèles unitaires satisfaisant les préceptes de l'individualisme. Cependant, nous devons aussi souligner que les hypothèses, sur lesquelles ces théorèmes sont basés, sont fortement criticables. Une seconde faiblesse, mise en

évidence par Lundberg (1988), est que l'approche unitaire est assez peu adaptée pour étudier certaines décisions des agents, telles que le choix marital ou le divorce, et plus généralement, pour analyser le comportement de ménages de composition différente. Cependant, la principale critique adressée à l'approche unitaire demeure l'absence importante, sinon totale, de support empirique. Les fonctions de comportement du ménage, engendrées par la maximisation d'une fonction d'utilité sous une contrainte budgétaire, doivent satisfaire au moins deux restrictions qui ont été régulièrement testées sur des observations empiriques. Tout d'abord, l'hypothèse d'agrégation des revenus (Income Pooling Hypothesis) ; seul le revenu total du ménage, et non sa répartition ex-ante selon son origine, est important pour expliquer les choix du ménage. Or de nombreux travaux font apparaître que les hommes et les femmes ne font pas le même usage de leur revenu. Lundberg et Pollak (1997) montrent, sur données britanniques, que la réallocation de certaines prestations familiales au profit de l'épouse, à montant global inchangé, a modifié les postes de consommation des familles. Dans le même contexte, et en utilisant données brésiliennes, Thomas (1993) prouve que le revenu aux mains des hommes n'a pas les mêmes conséquences sur la demande de biens des ménages que le revenu aux mains des femmes. Ces dernières consacrent une plus grande part du budget qu'elles contrôlent à des biens liés au capital humain. Ces faits empiriques suggèrent une non neutralité de la redistribution des richesses au sein des ménages dont le modèle unitaire ne peut rendre compte. Ensuite, selon l'approche unitaire, les effets compensés des prix sur les demandes de biens (ou de loisir) doivent être symétriques et négatifs, en vertu de la condition de Slutsky. Cependant, Browning et Chiappori (1998) montrent, en utilisant des données canadiennes, que la symétrie est rejetée pour les couples mais non pour les célibataires. Ces constatations, associées aux faiblesses théoriques et empiriques de l'approche unitaire, ont orienté les recherches récentes vers une nouvelle approche : l'approche collective.

1.2.3 L'approche collective

Des approches multidisciplinaires ont depuis longtemps attiré l'attention sur la multiplicité des niveaux de décision dans les sociétés contemporaines. La pluralité des unités de décision invite à la reconnaissance d'individus aux sphères d'activités plus ou moins autonomes à l'intérieur du ménage. Le ménage n'est pas le lieu d'un consensus dictatorial ou altruiste, les membres du ménage ont des intérêts à la fois convergents et divergents. Cette multiplicité des centres de décision remet en cause les modèles néoclassiques orthodoxes fondés sur l'homogénéité des préférences des membres du ménage. Ainsi, le modèle idéal serait un modèle de l'unité ménage décentralisée dans laquelle les individus auraient des degrés différents de responsabilité pour les décisions de production, de revenu et de dépense. Or, les modèles collectifs permettent d'envisager un tel ménage. L'approche collective a été développée par Pierre-André Chiappori et ses nombreux coauteurs (Chiappori, 1988, 1992 ; Browning et Chiappori 1998 ; Bourguignon, Browning, Chiappori, 2009 ; Chiappori et Ekeland, 2006, 2009). Elle occupe aujourd'hui une place prééminente en économie de la famille. En utilisant la terminologie de la théorie des jeux, nous pouvons distinguer deux manières structurelles de modéliser le comportement d'un ménage, soit par un équilibre non-coopératif de Nash, soit par un équilibre coopératif de négociation (bargaining).

1.2.3.1 Les modéles non coopératifs

Plusieurs auteurs ont utilisé l'approche non coopérative, basée sur le critère de meilleures réponses mutuelles de Nash, pour modéliser les individualités du ménage. Chaque membre a sa propre fonction d'utilité et définit ses actions indépendamment de celles prises par son conjoint en maximisant son utilité sous sa propre contrainte budgétaire (ou celle du ménage selon les modèles), en prenant les actions de l'autre comme données. Les issues stables à ce type de jeu sont des équilibres de Nash (1951) et

doivent correspondre aux meilleures réponses mutuelles de l'homme et de la femme. La première application connue d'un modèle non coopératif aux décisions intra-familiales est due à Leuthold (1968). Cette dernière modélise la décision jointe d'offre de travail d' un ménage composé de deux agents égoistes avec un bien public (la consommation du ménage) et deux biens exclusifs (le loisir de chaque individu). À l'équilibre, chaque individu maximise son utilité par rapport à la contrainte budgétaire du ménage en choisissant son offre de travail et la consommation publique. Leuthold montre qu'une augmentation des transferts sociaux conduit globalement à une diminution de l'offre de travail du ménage (du moins si le loisir est un bien normal). Plusieurs autres variantes théoriques se sont inspirés par la suite de l'article de Leuthold (1968), nous pouvons citer comme principales références : Ashworth et Ulph (1981), Bourguignon (1984), Ulph (1988),Woolley (1988), Kooreman et Kapteyn (1990) et Carter et Katz (1997). Cependant, la non efficacité des allocations d'équilibre au sens de Pareto demeure l'inconvénient majeur des modèles non coopératifs ; la solution de Cournot-Nash parait insatisfaisante dans l'étude du comportement des ménages (Chiappori et Donni, 2006).

1.2.3.2 Les modéles coopératifs

Contrairement aux modèles non-coopératifs qui supposent que les membres de ménage prennent leur décision de façon simultanée et non coordonnée, les modèles coopératifs fixent à priori une structure plus précise aux processus d'allocation des ressources intra ménages. Ces modèles représentent les décisions du ménage comme le produit d'une négociation entre les membres du ménage. Ils utilisent ainsi les outils de la théorie des jeux coopératifs. Pour comprendre un modèle ménage coopératif, on doit d'abord décrire la situation de chaque conjoint avant l'union. Cette situation est déterminante pour comprendre la répartition interne d'un ménage. En effet, la solution de Nash est la solution coopérative d'un jeu à deux personnes où le point de menace [8] de chaque

8. De façon plus simple, le point de menace correspond à la revendication minimale de l'individu, c'est-à -dire à ce qu'il obtiendrait seul, à l'extérieur du ménage. Toutes choses égales par ailleurs, plus

individu influence la négociation. Dans la littérature sur la négociation entre conjoints pendant le mariage, deux types de point de menace sont le plus souvent rencontrés : la situation en cas de divorce et la situation en cas de non coopération entre conjoints.

a- Modèles coopératifs avec divorce comme point de menace : Manser et Brown (1980) ainsi que McElroy et Horney (1981) ont appliqué le modèle coopératif de choix intra-familial au problème spécifique du mariage. Considérant un couple marié, et conditionnellement à cette donnée, ces auteurs font l'hypothèse que chaque acteur a le choix entre rester marié et divorcer. Les gains potentiels au mariage se répartissent selon un modèle de négociation aboutissant à une solution symétrique de Nash (1950, 1953), tandis que les points de menace correspondent à la situation de chacun en cas de divorce. En toute généralité, les points de menace peuvent dépendre de l'ensemble du système de prix, des revenus individuels et du revenu global du ménage. Néanmoins, d'autres facteurs, extérieurs aux préférences, peuvent influencer ce point de menace, ces variables sont couramment dénotées variables environnementales extra-familiales [9]. McElroy donne une liste détaillée de ces facteurs. Il peut s'agir de l'état du marché du mariage et du remariage (c'est-à-dire le ratio homme-femme de l'âge approprié), de la possibilité de retourner dans sa famille d'origine (richesse parentale) ; des restrictions imposées ou des facilités procurées par l'appartenance à des réseaux sociaux ou religieux (interdiction ou non du travail à l'extérieur de l'exploitation) ; de la législation concernant les droits de propriété, les divorces, les pensions alimentaires, les allocations familiales ; des modifications du barème des impôts selon la situation maritale . L'apport de ces paramètres extérieurs remet ainsi en avant l'importance des décisions d'ordre législatif dans la mise en oeuvre d'un développement plus équilibré qui revalorise la situation des membres les plus défavorisés du ménage.

---

la situation d'un individu est bonne à l'extérieur du ménage, plus cet individu est en position de force pour obtenir le partage des gains du ménage en sa faveur.

9. Ce sont des éléments qui modifient les points de menace sans affecter les prix et les revenus non salariaux auxquels font face les individus mariés.

Bien que McElroy (1990) détaille les conditions de l'évaluation empirique d'un tel modèle[10], rares sont les travaux présentant une application économétrique. En effet, la détermination des points de menace est loin d'être évidente. La situation en cas de divorce n'est pas observée et peut difficilement s'inférer théoriquement.

b- Point de menace associé à un jeu non coopératif : Ulph (1988) et Woolley (1988) suggèrent l'utilisation de l'issue d'un jeu non-coopératif comme point de menace. En particulier, Lundberg et Pollak (1993) montrent que, dans certaines conditions et notamment lorsque le point de menace est interne au marriage, un modèle coopératif peut ne pas aboutir à la neutralité du bénéficiaire d'une allocation sur le comportement du ménage.

En l'absence de coopération, les auteurs supposent que les partenaires se consacrent aux tâches qui leur sont attribuées par les normes sociales ou la tradition. Dans ce cas, les points de menace ne seront pas nécessairement affectés par des paramètres environnementaux extra-familiaux mais pourront être influencés par d'autres variables exogènes internes au ménage. De cette façon l'équilibre non-coopératif va correspondre à une répartition sexuée des rôles. Lundberg et Pollak ajoutent "*In a noncooperative marriage, a division of labor based on socially recognized and sanctioned gender roles emerges without explicit bargaining*". De ce fait, l'homme peut s'occuper de ramener l'argent dans le couple, tandis que la femme se consacrera à l'essentiel des tâches domestique et, en particulier, à la garde des enfants. L'issue d'un tel jeu noncoopératif permet de distinguer des couples "modernes" où les tâches sont distribuées de manière efficaces en respectant les avantages comparatifs de chacun et des couples "traditionnels" où la distribution des tâches est le résultat de normes sociales et culturelles[11]. Cependant,

10. McElroy et Horney (1981) dérivent une matrice de Slutsky généralisée dans le cas où les points de menace dépendent de variables environnementales extra-familiales. Ces auteurs proposent un test de validité du modèle unitaire contre un modèle coopératif avec divorce comme point de menace.

11. En présence de deux points de menace : divorce et sphères séparées de compétence, le point de menace maintenu sera le plus crédible, c'est-à-dire, celui qui fournit l'utilité indirecte la plus élevée(Couprie, 2004).

ce modèle n'explique ni comment les normes sont déterminées, ni pourquoi les sphères masculines et féminines sont séparées. Martin Browning, Pierre-André Chiappori et Valérie Lechene (2010) répondent partiellement à cette question en montrant que les couples qui ne collaborent pas ont intérêt à diviser les tâches en sphères disjointes.

1.2.4 Caractérisation de l'approche collective

1.2.4.1 Caractérisation générale de l'approche : le postulat de la Pareto-optimalité

Les modèles collectifs reposent sur deux hypothèses : chaque individu est doté de sa propre fonction d'utilité et le processus de décision entre les membres du ménage conduit à des allocations mutuellement avantageuses c'est à dire, collectivement efficaces au sens de Pareto. Cette propriété d'efficacité, centrale dans la dérivation du modèle, n'est pas un résultat, elle est postulée. En d'autres termes, tout écart par rapport à la situation d'équilibre obtenu, en ce qui concerne les décisions prises, quant à l'allocation du temps ou à la consommation de chaque membre du ménage, ne peut permettre une augmentation de satisfaction pour l'un, sans provoquer une diminution de la satisfaction de l'autre conjoint. Cette hypothèse est justifiée par l'argument selon lequel les agents sont dans une relation de long terme, de confiance, qui les amène à prendre des décisions efficaces ; "*... it seems necessary to limit the assumption on the decision process to some kind of minimum minimorum. The obvious candidate is of course Pareto efficiency. All cooperative concepts lead to Pareto-efficient outcomes ; and it is very doubtful that a cooperative decision could be considered as rational in any meaningful sense, if it results in nonefficient outcomes.* (Chiappori, 1988, p. 66). Pour comprendre cela, il faut se représenter toutes les allocations efficaces au sens de Pareto comme la frontière de l'ensemble de ses combinaisons d'utilité atteignables par les membres du ménage avec la contrainte budgétaire donnée. Cette frontière est représentée sur la **Figure** ci-dessous.

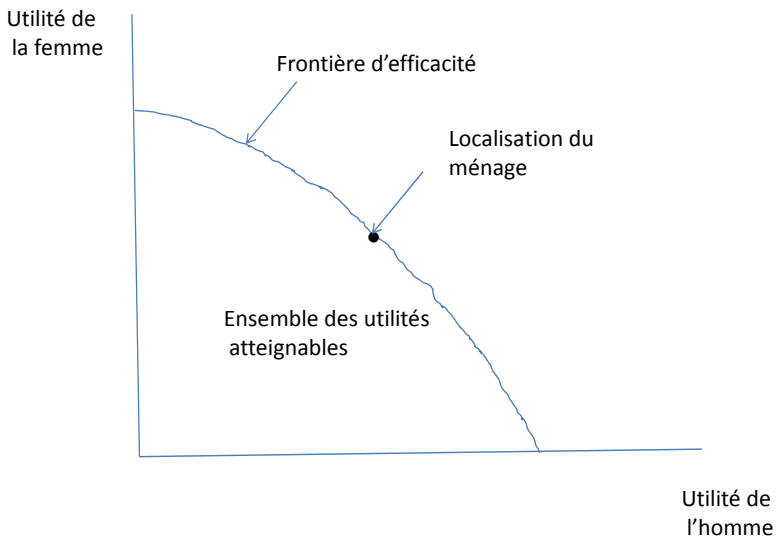

FIGURE 1.1 – La frontière d'efficacité

Lorsque le pouvoir de négociation de l'un des membres du ménage se détériore au profit d'un autre membre, l'équilibre se déplace le long de cette frontière. Ainsi, l'hypothèse d'efficacité est certainement l'extension la plus naturelle aux groupes d'individus de l'hypothèse de rationalité individuelle. On parlera donc ici de rationalité collective.

D'un point de vue empirique, et alors que le modèle unitaire implique des restrictions sur la matrice de Slutsky qui peuvent paraître difficilement acceptables, le modèle collectif autorise une pseudo-matrice de Slutsky, plus générale, incluant le cas unitaire. Les auteurs dérivent les propriétés de cette pseudo-matrice de Slutsky : celle-ci doit être la somme d'une matrice symétrique, semi-définie négative et d'une matrice de rang 1 au plus. La matrice symétrique reflète les effets prix et revenu standards de la fonction de demande Marshallienne, tandis que la matrice de rang 1 au plus regroupera les effets stratégiques induits par le comportement collectif du ménage. Tout système qui ne remplit pas ces conditions n'est pas compatible avec le cadre collectif. Notons que pour un ménage composé de deux personnes il faut disposer d'au moins cinq biens pour pouvoir tester la symétrie et la condition de rang de la matrice S. En deçà, elle est toujours vérifiée (Browning et Chiappori, 1998, p. 1253).

Si l'ensemble de ces conditions caractérise le cadre collectif adopté, il n'est cependant pas suffisant pour retrouver le processus d'allocation des ressources et les préférences individuelles à partir de la seule observation des fonctions de demande. D'autres hypothèses doivent être posées afin d'ajouter plus de structure au modèle.

1.2.4.2 Caractérisation particulère : l'approche en termes de règle de partage

Dans le cadre du modèle collectif, la distribution des ressources au sein du ménage a normalement une influence sur le comportement du ménage. Ce processus de distribution des ressources est représenté par une règle de partage "sharing rule". Cette fonction

décrit la règle de répartition interne des ressources que les conjoints suivent implicitement quand ils choisissent une allocation Pareto-optimale particulière (Bourguignon et al, 1995, p. 14). Selon Chiappori (1988), la négociation se déroulant entre conjoints peut s'interpréter comme une procédure à deux temps. Dans un premier temps, les conjoints s'accordent sur le partage de la richesse exogène ; ils déterminent une règle de partage. Cette règle de partage dépend, en toute généralité, du vecteur de prix des biens consommés, ainsi que du revenu total du ménage. Dans un second temps, chacun choisit ses consommations de façon à maximiser sa fonction d'utilité particulière sous la contrainte du budget obtenu après partage. Certes, la possibilité d'étudier le processus de distribution des ressources au sein du ménage fournit au modèle collectif une grande richesse d'interprétation, cependant, les aspects empiriques de cette règle de partage restent délicats à manipuler, pour des raisons d'identification essentiellement.

Lorsque toutes les consommations privées sont observées, l'identification de la règle de partage est immédiate, il suffit pour cela de sommer les dépenses privées individuelles observées. En l'absence d'une telle information, la règle de partage peut être identifiée à l'aide d'un bien assignable : un bien dont les consommations individuelles sont observées à l'intérieur du ménage. Dans ce contexte, Browning, Bourguignon, Chiappori et Lechene (1994) identifient les variations de la part du revenu privé du ménage obtenue par chaque conjoint grâce à l'observation des consommations, assignables, de vêtements. De même, Fortin et Lacroix (1997) considèrent le loisir comme un bien assignable pour déduire des restrictions testables du comportement collectif des ménage dans un programme d'offre de travail. Dans ces applications, les auteurs conçoivent les difficultés liées à l'hypothèse d'assignabilité d'un bien de consommation non testable lorsqu'un seul type de bien assignable par individu est envisagé, qui est déjà assez difficile à trouver.

Récemment, Chiappori, Fortin et Lacroix (2002) proposent de faire dépendre la règle de partage de facteurs de distributions. Ces variables sont les analogues des variables environnementales extra-familiales que l'on rencontre dans les modèles coopératifs avec

solution de Nash. Ainsi, les facteurs de distribution permettent d'expliquer la répartition du pouvoir de négociation au sein du couple sans influencer les préférences individuelles. Plus précisement, ces facteurs sont donc des variables qui, sans affecter l'ensemble des utilités atteignables, affectent la localisation de l'équilibre le long de la frontière (Figure 1.1). Chiappori, Fortin et Lacroix (2002) proposent d'utiliser la législation sur le divorce et le taux de masculinité (sex-ratio) comme facteurs de distribution, l'idée étant que ces variables influencent la situation en l'absence d'accord au sein de la famille.

La règle de partage représente le processus de négociation intra-familial en forme réduite. Cette notion assez populaire devient le symbole de toute la littérature sur les modèles collectifs. Néanmoins, l'idée d'introduire des facteurs de distribution de façon ad hoc dans cette règle de partage est une manière plus au moins arbitraire puisque l'introduction de ces variables dans la règle de partage sera effectuée selon une intuition économique ou sociologique, ce qui pourrait influencer le processus de négociation intra-familial (Couprie, 2004).

1.2.5 Développements récents : externalités dans les consommations intra-familiales

Le modèle collectif constitue une simplification à l'extrême dans la mesure où elle conçoit la famille comme un simple agrégat de consommations privées composée uniquement de deux conjoints. Or, les choses sont en réalité plus compliquées : les ménages ne sont pas toujours des couples, en particulier il ont souvent des enfants qui disposent d'un éventuel pouvoir sur les décisions intra ménage et qui peuvent affecter le niveau de consommation des parents. Par ailleurs, la prise en compte de l'influence des enfants dans les modes de consommation intra-familiaux est essentielle.

Pour les enfants en bas-âge, il suffit de considérer que ceux-ci n'ont pas de pouvoir de négociation. Dans ce cas, des parents altruistes envers leurs enfants vont prendre en compte le bien-être atteint par leurs enfants dans leurs fonctions d'utilités individuelles. Dans une telle situation, le bien-être de l'enfant peut être considéré comme un bien public puisque sa consommation par la mère ne réduit pas celle du père, même si les deux parents ne pondèrent pas de la même façon ce bien-être, ou ce vecteur de caractéristiques atteintes par les enfants, par rapport à leurs consommations privées. Chiappori, Blundell et Meghir (2002) considèrent une extension du modèle collectif en présence d'un bien public. Ils montrent que, sous l'hypothèse de séparabilité faible entre la consommation publique et les consommations privées, les propriétés d'identification de la règle de partage restent valides. Néanmoins, l'hypothèse de séparabilité simplifie la question des contributions au bien public puisque tous les effets transitent par la règle de partage et aucune substituabilité entre les consommations pour les enfants et les autres consommations n'est envisagée. Cette hypothèse a été testée par Donni (2004) et malheureusement rejetée. Lorsque les enfants disposent d'un pouvoir de négociation, ils doivent être considérés comme un décideur potentiel à l'intérieur du ménage. Harbaugh et al (2001) prouvent empiriquement que le choix des biens de consommation des enfants âgés de 7 ans est aussi rationnel que le choix des adultes. Dauphin, El Lahga, Fortin et Laccroix (2008) démontrent que les enfants adolescents ont leurs propres fonctions de préférences et le fait de négliger leurs rôle dans le processus de décision peut aboutir à des conclusions incorrectes.

Les aspects publics des consommations du ménage ne se limitent pas aux enfants. D'autres biens à l'intérieur des ménages revêtent clairement un caractère de bien public. Le logement et le chauffage en constituent probablement les meilleurs exemples. Il faut faire remarquer que cette consommation publique ou "partagée" génère des économies d'échelle à l'intérieur des ménages, ce qui devrait se refléter au niveau des échelles d'équivalence. Browning, Chiappori et Lewbel (2013) présentent un modèle collectif dans lequel la consommation observée des ménages est convertie en "équivalents-biens-privés". Cela se fait à l'aide d'une technologie de consommation incorporant toutes les

économies d'échelle générées par un ménage. Leur modèle est complètement identifié grâce à l'hypothèse que les préférences relatives aux équivalents-biens-privés sont les mêmes pour les individus appartenant à un couple que pour ceux vivant seuls. Observant les consommations privées des célibataires et les consommations privées agrégées des couples, et supposant une stabilité des préférences entre statuts familiaux, tous les composants structurels du modèle collectif (économies d'échelle et règle de partage) peuvent être identifiés. Selon Lewbel et Pendakur (2008), ce modèle est relativement difficile à estimer à cause de la non linéarité au niveau des prix et des dépenses. Ils propose ainsi d'utiliser une restriction "d'indépendance au choix de la base" pour identifier les échelles d'équivalence, ce qui revient à supposer que les économies d'échelle sont assumées d'être indépendantes des dépenses totales. Alternativement, Browning, Chiappori et Lewbel (2013) proposent d'appliquer une fonction de technologie de consommation linéaire similaire à celle de Barten (1964) et Gorman (1976) mais qui soit adaptée au cadre collectif : "*It will often be convenient to work with a linear consumption technology, which is mathematically identical to Gorman's (1976) linear technology (a special case of which is Barten (1964) scaling), except that we apply it in the context of a collective model.*"

Les développements récents du cadre collectif constitue le fondement de notre thèse dont nous présentons maintenant son résumé.

1.3 Résumé de la thèse

Cette thèse est composée de quatre chapitres qui ont tous pour objet l'analyse du lien entre statut marital et consommation. Après avoir passé en revue la théorie de mariage et l'évolution des outils théorique de la décision intra-familiale dans le premier chapitre, le deuxième chapitre se prèsente comme une application théorique de la relation "aversion au risque et choix marital". Le troisième et quatrième chapitre

sont essentiellement empiriques. Plus précisément, le troisième chapitre est une étude "exploratoire" de l'effet du statut marital sur le bien être des enfants. Alors que le quatrième chapitre propose un modèle structurel, inspiré des développements récents du modèle collectif, permettant l'estimation du coût individuel des enfants.

Dans le Chapitre II, nous nous intéressons, pour commencer, à modéliser théoriquement la relation "aversion au risque et statut marital" . Les fondements théoriques de ce travail se trouvent dans une généralisation de l'article de Arrondel et Calvo (2009). Dans cet article, ces deux auteurs présentent le statut marital comme un simple déterminant démographique du niveau d'aversion au risque des conjoints. Cependant, ce chapitre présente une démonstration théorique de l'effet du niveau d'aversion au risque des conjoints sur leur choix marital . Dans cette contribution théorique, le ménage est décrit par un modèle en deux étapes. Les partenaires se mettent en couple au début de la première étape, ils peuvent choisir entre le mariage et le concubinage, et partagent ainsi leurs ressources en fonction de leurs points de menace. Les résultats montrent que les conjoints averses au risque, confrontés seulement à un risque de négociation, doivent choisir le mariage, associé à un coût de séparation élevé, afin de diminuer les fluctuations de consommation intra ménage. Ce résultat sera ensuite généralisé avec l'introduction du risque de séparation/divorce. Ainsi nous montrons que le mariage demeure le choix optimal pour les conjoints averses au risque qui cherchent à minimiser la probabilité de rupture au sein du couple.

Dans le Chapitre III, nous partons de l'observation empirique que l'effet du statut marital sur les dépenses vêtements pour enfants au sein des ménages Britanniques a changé entre 1995 et 2007. Les résultats empiriques de cette étude exploratoire montrent que le statut marital (mariage vs concubinage) n'est plus un facteur significatif du bien être des enfants depuis 2002. Par ailleurs, cela explique aisément l'effet de la réforme financière mis en vigueur en UK en juillet 2002 qui vient essentiellement à protéger les droits financières des concubins et à réduire ainsi la différence de bien-être entre les couples mariés et les couples concubins. Un test de Chow a été mis en place pour

confirmer cette intuition et renforcer les résultats empiriques développés.

Dans le Chapitre IV, nous illustrons la relation "statut marital-consommation" par une application empirique plus structurelle en utilisant toujours des données Britanniques mais pour une plus longue période (1988-2007). Plus particulièrement, nous nous intéressons à l'estimation du coût individuel des enfants. Selon l'approche de Rothbarth, estimer le coût des enfants revient essentiellement à estimer la part budgétaire des enfants au sein du ménage. Ce chapitre propose une nouvelle méthode d'estimation, inspirée des développements récents du modèle collectif, permettant ainsi d'estimer le coût individuel des enfants. Sur la base de ces estimations, le coût des enfants est supporté plus par la femme que par l'homme.

Chapitre 2

Risk attitude and marital status

Abstract : Attitudes toward risk are an important determinant of a vast array of decisions, including one with a big impact on life, which is marital status. This chapter provide a theoretical demonstration on how risk preferences affect marital behavior. Results show that, confronted to bargaining risk, spouses risk averse prefer to live under marriage rather than cohabitation. Moreover, we show that more risk averse individuals need fewer incentives to enter into marriage when they are confronted to a risk of divorce.

2.1 Introduction

The theory of choice under uncertainty implies that individual's attitude towards risk is decisive in a variety of contexts that are critical for understanding individual behavior. There is a theoretical evidence that differences across individuals in observed behavior should reflect differences in risk preferences (Samuelson, 1969, Merton, 1969,

and Gollier, 2001a). As a result, difference in marital status (marriage vs cohabitation) between households can be explained by differences in risk aversion with the more risk-averse being able to choose marital status associated to lower variability in consumption and fewer potential in failure.

To prove this result, we construct a two-period model of household behavior, in which the decision process is described as a Rubinstein-Binmore bargaining game. The distribution of spouses' bargaining power may change as a consequence of new outside opportunities that are offered to them, so that individual consumption may fluctuate over time. This is what we call "bargaining risk". The future financial situation of spouses, which will influence the intra household balance of power, cannot be predicted at the moment of the marriage. If the state of nature turns to be markedly favorable to the husband, the latter can be inclined to take advantage of the situation and renege on the agreement made with his wife. To reduce this risk, we show that spouses risk averse have to choose marriage associated to the highest separation cost and thereby limit the attractiveness of spouses' outside opportunities.

Bargaining risk may persist even if divorce never takes place. To introduce the possibility of divorce in our model, we suppose that spouses receive new information that modify their subjective evaluation of the surplus from marriage. A large negative shock on the marriage surplus may, ultimately, lead spouses to the dissolution of the couple (which entails the complete loss of marital surplus and make bear spouses an individual separation cost). We then show that since a marriage raises the cost of separating, the conditional probability of a union ending may be lower once marriage has occurred. We find also that more risk averse individuals need fewer incentives to enter into marriage when they are submitted to a risk of divorce.

The paper is structured as follows. The related literature is discussed in section 2. The main assumptions on preferences, the form of uncertainty and the decision process are presented in section 3. Relationship between risk attitude and marital status is

discussed in a non-divorce model in section 4. The results are generalized to a divorce context in section 5. The last section concludes.

2.2 Risk aversion and behavior

Risk and uncertainty play a role in almost every important decision. As a consequence, understanding individual attitudes towards risk is intimately linked to the goal of understanding and predicting behavior. A growing literature has made progress on developing empirical and theoretical analyzes with the aim of capturing this important relationship between risk attitudes and behavior. Most of these studies have focussed on relating risk attitude to individual decision making, e.g. health decisions (Barsky and al, 1997 and Anderson and Mellor, 2008), labor decisions (Vesterlund, 1997 and Guiso and Paiella, 2001), and financial decisions (McInish, Ramaswami, and Srivastava, 1993 and Lezzi, 2008). Only a few studies have explicitly explored the relation between risk attitude and marital decisions.

There is a long-standing belief that much of people's health behaviors and health decision-making comes down to personality traits and the origins of specific preferences. Classic studies (Farrell and Fuchs 1982) suggest that there are unobservable, fundamental characteristics, such as aversion to risk, which are associated with good health behaviors. These characteristics drive avoidance of risky health behaviors, such as smoking, and can lead to improved health outcomes. Recent studies using experimental design confirm this association more directly. For example, using an especially large sample, 14,000 individuals living in the US drawn from the Health and Retirement Survey, Barsky and al (1997) find that those who smoke, drink heavily and have no health or life insurance are more risk tolerant. In the same context, and using Holt and Laury's (2002) measures of risk aversion, Anderson and Mellor (2008) show that indi-

viduals who are risk averse are less likely to be overweight or drive over the speed limit, and are more likely to use a seat belt. For the validity of the relationship between risk attitude and labor decisions making, we return to an analysis of Lise Vesterlund (1997). Using a simple matching model, Vesterlund has examined the effect of risk aversion on the wage distribution and on equilibrium participation and employment. In particular, author find that two workers who are equally qualified and search from the same pool of jobs will not receive the same wage if they differ in their attitudes toward risk. The more risk averse workers accept lower quality matches, and conditional on productivity they receive lower wages. Numerical solutions to the model also suggest that less risk averse workers are more likely to participate in the labor market and, conditional on participation, they have higher unemployment rates and expect longer unemployment spells. These findings are similar to that of Guiso and Paiella (2001). Using a sample of 8,135 heads of households from the Italy's Survey on Household Income and Wealth, risk averse individuals are found to be more likely to work in the public sector and less likely to be self-employed and have a much lower probability to be job changers. Not surprisingly, heterogeneity in risk preferences is also determinant in financial market. Based on the capital asset pricing model, McInish, Ramaswami, and Srivastava (1993) studied the relationship between net worth and risk aversion. They assumed that the investment choice along the risk/return line depended on the investor's attitude toward risk. Thus, more risk-averse investors should hold less risky portfolios, which would lead to lower levels of wealth. In order to provide more evidence on the role of risk aversion on financial decisions, Stefano Lezzi (2008) has applied a Bayesian procedure on data from the 2006 Survey of Household Income and Wealth by the Bank of Italy, to show that risk aversion is a strong predictor of the probability to hold risky assets. His analysis suggest that probability of misclassification decreases as latent risk aversion increases, that means that more risk tolerant investors tend to be classified erroneously more often than less risk tolerant investors.

Unfortunately, little is known about risk aversion in relation to marital decisions. One of few studies which explicitly investigate the impact of risk preference on marital

behavior is that of Christy Spivey (2006). Using information on risk preferences from the 1979 National Longitudinal Survey of Youth (NLSY79), Spivey predict the effect of an individual's risk aversion on time to marriage and show that risk aversion significantly affects time to marriage, with more risk averse respondents marrying sooner than their more risk loving counterparts. Further, he finds that the effect of risk aversion on time to marriage is larger in magnitude and more statistically significant for men. The present paper is easily positioned in this literature. Specially, we provide a theoretical demonstration on how risk attitudes affect the choice of marital status (marriage vs cohabitation). The empirical study of Arrondel and Calvo (2009) predict that the level of risk aversion within married couple is more important than those within cohabitors. Such a strategy ask what demographic variables affect risk aversion, however, we investigate in this paper the impact of risk aversion on marital behavior. We show that differences in marital status between household can be explained by differences in risk attitudes. Our analysis is closely related to the most recent developments of the literature on bargaining model presented in the following section.

2.3 Theoretical model

Cooperative bargaining models in general, and the Nash bargaining models in particular, have become the standard tool for analyzing intra family allocation. In a Nash bargaining model each spouse's well-being in the cooperative equilibrium is an increasing function of his or her well-being at the "threat point." Nevertheless, the specification of the threat point differs from one bargaining model to another. In the bargaining models of marriage originally proposed by Manser and Brown (1980) and by McElroy and Horney (1981) the threat point and the reservation utilities coincide with each other and correspond to the utility of divorce. Thus, the threat point in these models is external to the marriage. In contrast, in the "separate spheres" model of Lundberg and Pollak (1993), the threat point is internal to the marriage and corresponds to a

"noncooperative marriage" [1]. It is noticeable that almost all of the bargaining situations involve uncertainty (White 2008). Individuals does not know whether an accident will happen when they are bargaining over the insurance contract. More precisely, participants in marriage have no idea of new outside opportunity that may be offered to them and then they are uncertain about the outcome they can expect with potential mates at the time of the formation of the couple. Comparing to the well-analyzed situation of bargaining with deterministic outcome, bargaining with risky outcome is much difficult to study. For example, a frequently cited proposition in the deterministic bargaining literature asserts that an increase in one's degree of risk aversion improves the welfare of one's opponent. Intuitively, the subjective possibility of strategically reaching disagreement and its costly consequence makes risk aversion disadvantageous in bargaining (Kannai, 1977 ; Roth, 1979 ; Kihlstrom, Roth and Schmeidler, 1981 and Sobel, 1981). Moreover, the key assumption of Nash bargaining model is that the outcomes of the decision process are always efficient, in the sense that no alternative decision would have been preferred by all members. The efficiency assumption needs, nevertheless, careful justification. Within an uncertain context, this assumption amounts to the requirement that married partners will find a way to take advantage of opportunities that make both of them better off. The connection of risky environment to bargaining models is then less direct : the complexity of the analysis of bargaining models with risky outcome and risky disagreement impedes the application of such models. Indeed, the success of these classic models in the theoretical economics literature rests on their simplicity. Since we consider the bargainers' decisions in a risky environment, we must think for more structural model which can consider explicitly risk preferences for the household context. This paper provide a simple specification inspired from Donni's bargaining model (Donni, 2014) in which the decision process is described as a Rubinstein-Binmore bargaining game [2].

1. Lundberg and Pollak model the noncooperative marriage as a voluntary contribution game in which spouses allocate some of their resources to provide household public goods.

2. This specification is also similar to the bargaining model of Adam, Hoddinott, and Ligon (2004).

2.3.1 Marital status, preferences and uncertainty

We examine the main assumptions of the model. To begin with, we consider a two-person household in a two-period setting. During the first period, the spouses make decisions about marital status. The two partners can choose to live under consensual union or legal marriage. From an economic point of view, marriage, as cohabitation, is a partnership for the purpose of joint production and joint consumption. But there are other important gains from partnership, both economic and emotional[3]. Let θ_M and θ_C denotes respectively gains from marriage and cohabitation. To simplify notation, we suppose $\theta^M = \theta^C = \theta$, where θ is a positive constant which may differ between couples. During the first and the second period, the spouses spend their resources on the sole private good. Let $x_{i,t}$ denote the individual consumption of the private good of spouse i $(i = F, H)$ at period t $(t = 1, 2)$. However, marriage as cohabitation can be considered as a public good which generates utility for both spouses equal to θ.

For comparing risk aversion across individuals during the two periods, we need to consider people with identical and inter temporally additive utility functions. Then, we suppose that utility functions at each period are of the Von-Neuman-Morgenstern form with an additive structure, that is,

$$U = u(x_{it}) + \theta \tag{2.1}$$

where u (.) is a three times differentiable function that satisfies

$u'(x_{it}) > 0$, $u''(x_{it}) < 0$, $u'''(x_{it}) < 0$, and $u'(0) = \infty$.

The household as a whole receives an exogenous income, denoted by Y_t, at each period t. The amount of these incomes is non-stochastic and completely determined at the beginning of the first period. In the second period, the household income can be broken down into individual incomes, that is, $Y_2 = y_1 + y_2$, where y_i is the exogenous

3. See Browning, Chiappori and Weiss, 2009, chapter2.

personal income of spouse i. The distribution of the individual incomes between spouses is stochastic and such that

$$y_i = \frac{Y_2}{2} - \Sigma\varepsilon \tag{2.2}$$

and

$$y_j = \frac{Y_2}{2} + \Sigma\varepsilon \tag{2.3}$$

where ε is a random term which follows a symmetric distribution with support $[-\frac{1}{2}, \frac{1}{2}]$ and $0 < \Sigma \leq Y_2$ is a parameter of dispersion. At the beginning of the first period, couples are formed in an optimal way ; they put themselves inevitably in couple because $\theta > 0$. At the end of the first period, each spouse is informed of what she or he will receive as individual income y_i for the second period. The distribution of these individual incomes is thus the sole source of uncertainty for the moment (since the sum of individual incomes is deterministic). However, entering into marriage market opens up the possibility of divorce. Thus, we suppose that the dissolution of the couples, at the end of the first period, entails the loss of the marital surplus and make bear spouses an individual separation cost k [4]. Nevertheless, since a marriage contract raises the cost of separating, we argue that risk averse individuals will want to make it more difficult for their partner to leave.

2.3.2 The sharing of private consumption

The private consumption is shared between spouses according to some rule that depends on the household environment. If we consider initially a symmetrical household environment, that means both spouses have the same utility functions and the same anticipations, it will be natural to suppose that the first period household income is equally divided between spouses . The level of utility obtained by each spouse in the

4. The possibility of remarriage during the second period is eliminated from the model : there is no secondary market which allows divorced couples to reward the loss of the marital surplus.

first period is then given by

$$U_1 = u(\frac{Y_1}{2}) + \theta \tag{2.4}$$

This assumption, if plausible, requires that, at the moment of the marriage, the partners have approximately the same outside opportunities.

In the second period, the specification of household income sharing become more complicated. In this case, the sharing rule will generally be a function of the respective individual incomes that spouses observe at the end of the first period. Following Rubinstein-Binmore bargaining models, we suppose that outside opportunities are given here by the level of utility obtained in the case of divorce [5]. Otherwise, the distribution of consumption is subject to the constraint that the spouses obtain at least the level of utility of divorce which is equal to $(u(y_i) - k)$ in our model. The dissolution of the couple is necessarily inefficient because it entails the loss of the marital surplus and make bear couples a separation cost. Therefore, the spouses can always bargain and redistribute resources in such a way that divorce never occurs [6]. The participation constraint of spouse i will be binding if the realized value of the individual income y_i is above a reservation value y^* implicitly defined by

$$u(\frac{Y_2}{2}) + \theta = u(y^*) - k$$

therefore :

$$u(\frac{Y_2}{2}) + \theta + k = u(y^*) \tag{2.5}$$

The reservation value is thus the level of individual income for which spouse i is indifferent between remaining married (with an equal sharing of the second-period income) and divorcing, otherwise is the level of individual income for which utility is the same when spouse i lives with her partner and when she lives as single. This value is the same for both spouses because of the symmetry of the framework. To fix idea and simplify

5. See Binmore, Rubinstein and Wolinsky (1986) for a pedagogical introduction.

6. This is a traditional application of the Coase Theorem. The possibility of divorce will be introduced in the next section.

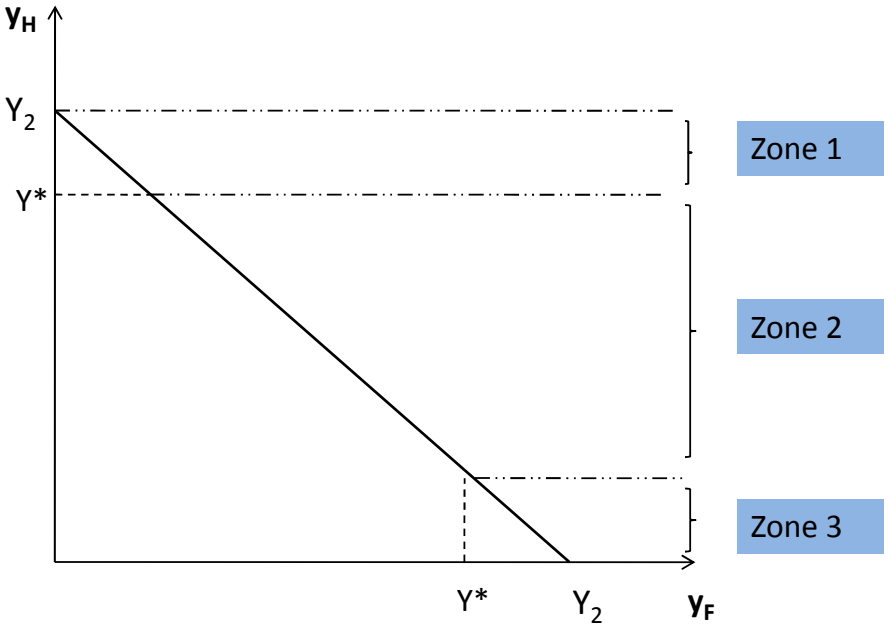

FIGURE 2.1 – Spouses' bargaining power in the second period

notations, Figure 2.1 summarizes all possible states which can take place during the second period. According to the realized value of the individual income observed at the end of the first period y_i for $i = F, H$ where $y_F + y_H = Y_2$, spouses will be in one of the three following states : First, **Zone 2** considers the case where the spouses are able to commit to an allocation of resources for the future. In other words, idiosyncratic risks are completely eliminated by efficient risk sharing[7]. In that case, the level of consumption assured to both spouses in the second period will be equal to $\frac{Y_2}{2}$. In **zone 1**, man has the opportunity to have an income greater than the reservation value y^* and thus he should renegotiate the intra allocation of resources to his profit. However, in **zone 3**, positions of spouses overturn : woman can benefit from an income greater than the critical income y^* and thus she can ask for an increase in her consumption. Knowing that separation is simpler in the case of cohabitation and that associated cost is low with regard to marriage, cohabiting couples have strongly the chance to be in **zone 1** and **3**. Within cohabiting couples, the possibility of renegotiation of resources, during the second period, strengthens and thus fluctuations in consumption increase.

2.4 Marital status and bargaining risk

2.4.1 The bargaining risk

Spouses are submitted to a bargaining risk when the participation constraint of one spouse is binding (zone 1 and 3) . We remind that the participation constraints are binding if and only if the individual income of one spouse is above the reservation value y^*, that is, and

$$\frac{Y_2}{2} \pm \Sigma\varepsilon > y^*(\theta, k), \varepsilon \in [-\frac{1}{2}, \frac{1}{2}] \tag{2.6}$$

7. Lommerud (1989) supports the idea that, in a couple where spouses are strongly emotionally attached to each other, outcome can be enforced by the simple fact that spouses take care of their reputation. This is what this author calls “voice enforcement”.

The density distribution function of ε is symmetric and denoted by $\phi(\varepsilon)$, the support of which is $[-\frac{1}{2}, \frac{1}{2}]$, with $\phi(-\frac{1}{2}) = \phi(\frac{1}{2}) = 0$. Spouse i will be in position of demanding a greater share of private consumption if the individual income she or he receives at the second period is greater than the reservation value y^*. The fluctuations in consumption which result from variations in spouses' bargaining power represent what we call "bargaining risk". Let η_i a function which represents the smallest transfer received by spouse i such that she accepts to remain in the marriage. It is formally defined by

$$u(y_i) = u(\eta_i) + \theta + k \tag{2.7}$$

This equation has a unique solution which is denoted by $\eta_i = \eta(y_i, \theta, k)$, where ;

$$0 < \frac{\partial \eta}{\partial y_i} < 1, \frac{\partial \eta}{\partial \theta} = \frac{\partial \eta}{\partial k} < 0$$

That is, an increase in the level of gains from marriage or in the cost of separation has a negative impact on what can be demanded by the spouse, with a credible opportunity of leaving, and then on fluctuations in consumption within household. As results, resources received by spouse i during the second period must always be equal to [8] :

$$\begin{cases} Y_2 - \eta & \text{if } \frac{Y_2 - \Sigma}{2} < y_i \leq Y_2 - y^* \\ \frac{Y_2}{2} & \text{if } Y_2 - y^* < y_i \leq y^* \\ \eta & \text{if } y^* < y_i \leq \frac{Y_2 + \Sigma}{2} \end{cases}$$

2.4.2 The propensity to marry

To begin with, we suppose that expected utility function for spouse i at the second period is obtained by integrating ε over its domain. According to the realized value of the individual income y_i observed at the end of the first period, spouse i will be in one of the following states ;

8. We note that the states 1 and 3 occur if Σ is sufficiently large.

$$E(U_2/k) = \frac{1}{\Sigma}[u(\frac{Y_2}{2}) \int_{Y_2-y^*}^{y^*} f(t).dt + \int_{y^*}^{\frac{Y_2+\Sigma}{2}} u(\eta(t))f(t).dt$$

$$+ \int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y^*} u(Y_2 - \eta(t))f(t).dt] + \theta \tag{2.8}$$

where,

$$f(t) = \phi(\frac{2t - Y_2}{2\Sigma})$$

The first integral on the right-hand side represents the contribution to the expected utility when the two participation constraints are non-binding. The second integral represents the contribution when the participation constraint of one spouse i is binding. The third integral represents the contribution when the participation constraint of one spouse j is binding. Let PM^B be the propensity to marry of spouse i confronted to bargaining risk, as follows :

$$PM^B = E(U_2^M/k^M) - E(U_2^C/k^C) \tag{2.9}$$

Hence, if we suppose that θ has a continuous distribution, then the proportion of marriages will be a function of PM^B. Following the definition above of PM^B, persons marry when the utility expected from the marriage

$$E(U_2^M/k^M) = \frac{1}{\Sigma}[u(\frac{Y_2}{2}) \int_{Y_2-y_M^*}^{y_M^*} f(t).dt + \int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} u(\eta^M(t))f(t).dt$$

$$+ \int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_M^*} u(Y_2 - \eta^M(t))f(t).dt] + \theta$$

exceeds the utility expected from cohabiting.

$$E(U_2^C/k^C) = \frac{1}{\Sigma}[u(\frac{Y_2}{2}) \int_{Y_2-y_C^*}^{y_C^*} f(t).dt + \int_{y_C^*}^{\frac{Y_2+\Sigma}{2}} u(\eta^C(t))f(t).dt$$

$$+ \int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_C^*} u(Y_2 - \eta^C(t))f(t).dt] + \theta$$

Using a convenient change of variable, as shown in **APPENDIX A**, the propensity to marry of spouse i can be written as :

$$PM^B = \frac{1}{\Sigma}[u(\frac{Y_2}{2})(\int_{Y_2-y_M^*}^{y_M^*} f(t).dt - \int_{Y_2-y_C^*}^{y_C^*} f(t).dt) + u(Y_2)(\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} f(t).dt$$

$$- \int_{y_C^*}^{\frac{Y_2+\Sigma}{2}} f(t).dt)] \tag{2.10}$$

Propensity to marry equation suggest a relationship between marital status decision (married vs cohabiting) and divorce cost. The sign of the derivative of the propensity to marry with respect to divorce cost k^M seems to indicate the nature of this relation ; higher divorce cost make marriage less risky, so single individuals may be more likely to marry :

$$\frac{\partial PM^B}{\partial k^M} = -\frac{1}{\Sigma}.[\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} (1 - \frac{u^{'}(Y_2 - \eta^M)}{u^{'}(\eta^M)}) f(t)dt] > 0 \tag{2.11}$$

This expression is clearly positive since the utility function is concave. When the level of divorce cost k^M become relatively higher than k^C, the share of consumption that the spouse with a credible threat of divorce can demand will be relatively reduced. Thus, confronted to bargaining risk ($\Sigma \neq 0$), the risk-averse spouses will choose marriage in the beginning of the first period to reduce the fluctuations in future individual consumption. Nevertheless, if there are no variations in individual incomes in the end of the first period ($\Sigma = 0$), the whole integral will be equal to zero and spouses will be indifferent between marriage and cohabitation in the beginning of the first period [9]. More precisely, the derivative of the propensity to marry is an increasing function of spouses' risk-aversion $-(1 - \frac{u^{'}(Y_2-\eta^M)}{u^{'}(\eta^M)})$ which is proportionate to a measure of the concavity of the utility function. Following the Arrow-Pratt measures of comparative risk attitudes for agents, the risk aversion measure for agent i is greater than the risk aversion measure for agent j if and only if the utility function for agent i is a strictly increasing and strictly concave transformation of the utility function of agent j [10]. A version of this proposition that applies to our context is derived simply by :

9. Of course it is because we suppose that $\theta^M = \theta^C$.
10. For more see Kimball(1990) and Gollier (2001b).

Proposition1. *If U is an utility function more concave than u and F is a strictly increasing and strictly concave function, then :*

$$PM^B(F(u)) > PM^B(u)$$

Proof. The propensity to marry is an increasing function of the level of risk-aversion if and only if :

$$-(1 - \frac{F^{'}(u(Y_2 - \eta^M)) \cdot u^{'}(Y_2 - \eta^M)}{F^{'}(u(\eta^M)) \cdot u^{'}(\eta^M)}) > -(1 - \frac{u^{'}(Y_2 - \eta^M)}{u^{'}(\eta^M)})$$

that is,

$$\frac{F^{'}(u(Y_2 - \eta^M)) \cdot u^{'}(Y_2 - \eta^M)}{F^{'}(u(\eta^M)) \cdot u^{'}(\eta^M)} > \frac{u^{'}(Y_2 - \eta^M)}{u^{'}(\eta^M)}$$

This inequality is verified since the function u is strictly increasing and F is strictly concave. **Proposition 1** makes clear that, all other things being the same, the distribution of individual consumption will tend to be more egalitarian, or at least more stable, in married households associated with a high level of risk-aversion than in cohabiting households.

2.5 Marital status and divorce risk

Thus far we have analyzed the relationship between risk preferences and marital status when spouses are submitted only to a bargaining risk. In this section, we shall incorporate the risk of divorce and examine if intra household decision is modified.

2.5.1 The risk of divorce

The sole hypotheses associated to the distribution of individual incomes are not sufficient to generate a positive probability of dissolution. Following Becker, Landes and Michael (1977) and Weiss and Willis (1997), we suppose that divorce is motivated by uncertainty and changing circumstances. Thus, individuals may enter a relationship and then break it if a better match is met. In other words, changing economic and emotional circumstances may dissipate the gains from marriage. As time passes, new information on match quality and outside options is accumulated, and each partner decides whether to dissolve the partnership. Formally, we suppose that the level of utility of each spouse at the second period, in the case where the family remains intact, is perturbed by a random term which represents new information, that is,

$$V_2(\theta, \nu, k) = \begin{cases} U_2(\theta) + \nu\Omega & \text{if the spouses remain together} \\ U_2(\theta) - k & \text{if the spouses decide to separate} \end{cases}$$

where $V_2(\theta, \nu, k)$ is the level of utility after the new information is revealed to spouses, $U_2(\theta)$ has the same definition as indicated above, ν is a random term and $\Omega > 0$ is a constant that can be interpreted as an exogenous tendency to divorce. The density distribution function of ν, is symmetric and denoted by $\varphi(\nu)$, the support of which is $[-\frac{1}{2}, \frac{1}{2}]$, with the continuity property $\varphi(-\frac{1}{2}) = \varphi(\frac{1}{2}) = 0$. The new information arriving at the household has thus exactly the same effect on the welfare of both spouses. The marriage dissolution is the optimal solution (D = 1) if the random term is such that the marriage surplus of the second period is completely swallowed up, that is,

$$\theta + \nu\Omega + k \leq 0$$

In particular, the loss in utility due to the negative shock vanishes if spouses divorce. However, we remind that divorce decision will make bear spouses a separation cost which differ according to couple's marital status. Probability of divorce is then a function of

θ and k given by

$$Pr(D=1/k)=\begin{cases}0 & \text{if } \Omega \leq 2(\theta+k)\\ \int_{-\frac{1}{2}}^{-\frac{(\theta+k)}{\Omega}}\varphi(\nu)d\nu & \text{if } \Omega > 2(\theta+k)\end{cases}$$

This result implies that if individual separation cost takes two different values according to the spouses' marital status (k^M, k^C), then the conditional probability of a union ending may be lower once marriage has occurred.

2.5.2 The propensity to marry

Using the law of iterated expectations, the (conditional) expected utility of each spouse is given by

$$E(V_2/k)=E(V_2/k,D=1)\times Pr(D=1/k)+E(V_2/k,D=0)\times Pr(D=0/k) \quad (2.12)$$

where ;

$$E(V_2/k,D=0)=\frac{\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}}E(U_2/\theta+\Omega\nu,k)\varphi(\nu)d\nu}{\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}}\varphi(\nu)d\nu} \quad (2.13)$$

is the conditional expected utility given that the couple does not divorce, and

$$E(V_2/k,D=1)=\int_{-\frac{1}{2}}^{+\frac{1}{2}}u(\frac{Y_2}{2}+\Sigma\varepsilon).\phi(\varepsilon).d\varepsilon-k \quad (2.14)$$

is the conditional expected utility given that the couple divorces, that is

$$E(V_2/k)=[\int_{-\frac{1}{2}}^{+\frac{1}{2}}u(\frac{Y_2}{2}+\Sigma\varepsilon).\phi(\varepsilon).d\varepsilon-k]\times\int_{-\frac{1}{2}}^{-\frac{(\theta+k)}{\Omega}}\varphi(\nu)d\nu+$$

$$[\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}}E(U_2/\theta+\Omega\nu,k)\varphi(\nu)d\nu] \quad (2.15)$$

When spouses are faced with a large negative shock, divorce may be the optimal strategy. In the case of the couple's dissolution, the level of private consumption assured to both spouses in the second period must remain constant and equal to $\frac{Y_2}{2}$, however, each spouse will support a separation cost equal to k. Let PM^D be the propensity to marry of spouse i confronted to divorce risk, as follows :

$$PM^D = E(V_2^M/k^M) - E(V_2^C/k^C) \tag{2.16}$$

Using results derived above, and applying the Leibniz rule, we can show that the derivative of the propensity to marry with respect to k^M can be written as :

$$\frac{\partial PM^D}{\partial k^M} = \frac{\partial E(V_2^M/k^M)}{\partial k^M}$$

$$= -\int_{-\frac{1}{2}}^{-\frac{(\theta+k^M)}{\Omega}} \varphi(\nu)d\nu - \frac{1}{\sum}\int_{-\frac{(\theta+k^M)}{\Omega}}^{+\frac{1}{2}} [\int_{y_M^*}^{\frac{Y_2+\sum}{2}} [1 - \frac{u^{'}(Y_2-\eta^M)}{u^{'}(\eta^M)}]f(t)dt].\varphi(\nu)d\nu \tag{2.17}$$

From equation (2.17), an increase in divorce cost has a double impacts on the propensity to marry. The first effect of divorce cost is conformed to the intuition of Bougheas and Georgellis (1999), Brien et al. (2006), and Matouschek and Rasul (2008), that higher divorce costs make marriage more costly, so single individuals may be less likely to marry. The first integral on the right-hand side, which corresponds to the opposite of divorce probability, illustrate this intuition ; when divorce cost k^M become relatively higher than separation cost k^C, the propensity to marry, in a divorce context, decrease. One can see, though, that the complete story is more complicated : a high divorce cost may also have a positive effect on marriage propensity. Following the second integral, when divorce cost become relatively higher than separation cost, fluctuations in individual consumption decrease and the propensity to marry increases. More precisely, when the risk of divorce is eliminated and thus the distribution of individual incomes is the sole source of uncertainty, propensity to marry is then an increasing function of spouses' risk-aversion $-(1 - \frac{u^{'}(Y_2-\eta^M)}{u^{'}(\eta^M)})$ which is proportionate to a measure of the concavity of

the utility function. A version of this proposition that applies to our context is derived simply by :

Proposition2. *If U is an utility function more concave than u and F is a strictly increasing and strictly concave function, then :*

$$PM^D(F(u)) > PM^D(u)$$

Proof. Demonstration used for **Proposition1** is still valid for **Proposition2**.

Equation (2.17) make clear that, in a divorce context, relationship between divorce cost and propensity to marry is indefinite. This result is not surprising, theoretical literature on the effect of divorce costs on individuals' family formation decisions has generated several models and no consensus as to the direction of this effect (Yurko, 2014). The empirical evidence is also ambiguous : while Matouschek and Rasul (2008) find a negative effect between divorce costs and marriage rates, Other authors argue that easier divorce laws reduce the benefits of marriage and make singles less likely to marry (Rasul, 2005 and Wydick, 2007) [11]. The analysis demonstrates that risk attitude is an important determinant of spouses' marital status but it's not the unique. Results suggest that, in a divorce context, propensity to marry depend on other factors which may influence the individuals' decision to marry legally rather than to cohabit.

2.6 Conclusion

Understanding the role that risk preferences play in influencing the choice of marital status is important, since risk attitudes likely play a central role in all kinds of decision-making. While this need to understand the relationship between individual variation in

11. This is exactly what is theoretically proved here.

risk attitudes and marital status is widely acknowledged, limited empirical studies exist that undertake the task. This is largely due to a lack of the type of data required to construct empirical measures of risk aversion for different marital status. Some studies focus on how demographic variables affect risk aversion, but no studies have analyzed the relationship between risk preferences and marital status decisions. The current study attempts to do just this.

The initial empirical motivation is inspired from Arrondel and Calvo's (2009) job. Using French data from the National Institute for Statistics and Economic Studies "Patrimoine 2004", Arrondel and Calvo compared the level of risk aversion of married couples to that of cohabiting couples and they showed that married spouses are less adventurous than cohabitors. Such a strategy ask what demographic variables affect risk aversion, however, this paper provide a theoretical demonstration on how risk attitudes affect the choice of marital status when spouses are submitted to different types of risks. Results show that, confronted to bargaining risk, spouses risk averse prefer to live under marriage rather than cohabitation. Moreover, we show that more risk averse individuals need fewer incentives to enter into marriage when they are confronted to a risk of divorce. However, the analysis demonstrates that when the surplus of marriage is stochastic, relationship between divorce cost and marriage propensity is non-monotone. These theoretical results can be used to explain empirical ambiguity between Wydick's study (2007) and those of Matouschek and Rasul (2008).

In presenting its findings, the analysis that follows is subject to a lack of empirical support. Thus, an empirical extension to the study can make model more realistic.

Chapitre 3

Contribution of financial reform to children's expenditures

Abstract : Regression results suggest that marital status household is no more significant determinant of children's clothing expenditures since the year 2002. Difference in children's clothing demand is became less strong between married couple and cohabiting households with the introduction of financial law reform in July 2002. It was recommended that government must consider legal protection for cohabiting couples to provide individuals with high relationship quality and make it likely for them to invest more time and energy in children's well-being.

3.1 Introduction

Living arrangements in the UK have undergone considerable change in recent decades. Marriage is no longer the exclusive context of family formation. In 2006, one in six couples were cohabiting (2.3 million couples). More than a third (36%) of the

public in England and Wales had been in a cohabiting relationship at some time [1]. In 2005, 39% of single individuals aged 25 to 34 were cohabiting. For those aged 35 to 49, the proportion was 30%. Between 1996 and 2006, the number of cohabiting couples in the UK increased by over 60% to 2.3 million. This number is projected to almost double to 3.8 million by 2031 [2]. However, the higher cohabitation rate is associated with a decrease in marriage rate ; the number of married couples in the UK fell by over 4% (0.5 million) between 1996 and 2006 to just over 12 million. The number registered in 2007 was the lowest number since 1895 and fell by 3.3% compared to 2006.

The transformation of family in the UK, fueled by continuing high rate of cohabitation and low rate of marriage, is inextricably linked to the changing living arrangements and economic status of children (Bianchi, 1990 ; Duncan and Rodgers, 1991 ; Eggebeen and Lichter, 1991 ; Hernandez, 1993). Yet most previous studies have failed to explicitly consider parental cohabitation in evaluating the living arrangements and economic well-being of children. Children are increasingly likely to be born into a cohabiting couple and raised by parents who are cohabiting (Bumpass and Raley, 1995 ; Bumpass and Sweet, 1989). The 2001 Census recorded that over 740,000 cohabiting couples in England and Wales had dependent children between them supporting 1.27 million children. The number of cohabiting couple households with dependent children more than doubled between 1991 and 2001 and by 2006 1.49 million dependent children in the UK, almost 12% of the total number of dependent children, lived in cohabiting couple families.

The complexity of children's family life is often ignored ; most researchers simply distinguish between children living in two-parent and single parent families. Nevertheless, family sociologists and demographers are calling for more precise definitions of family

1. Sources : Focus on Families 2007, Office for National Statistics ; British Social Attitudes Report 2007/2008, National Center for Social Research.

2. Sources : Cohabitation : The Financial Consequences of Relationship Breakdown, Law Commission No307 ; Focus on Families 2007 ; National Statistics Online February 2009 - Focus on Families - Overview of Families ; National Statistics Population Trends No121 Autumn 2005.

relationships that include cohabitation. Efforts to understand children's experiences in cohabiting families have to be important because several studies, like Manning and Lichter's study (1996), have reported that children in cohabiting-parent households are disadvantaged compared with children in married-parent households. More precisely, Deleire and Khalil (2005) show that children from cohabiting-parent households have lower academic performance, lower initiative, and more school problems than children from families with married parents, net of socio demographic characteristics, economic resources, and parental behaviors. Nevertheless, in recent decades, differences in children's well-being are no more often attributed to differences in parent's marital status (Omori, 2010). The economic disadvantage of cohabiting households in UK is became less strong when financial law reform structural was introduced in July 2002 : it was accepted that the current law in UK was inadequate and given rise to unwelcome consequences. In 2002, the Law Commission published a Discussion Paper "Sharing Homes" [3]. This paper considered the law relating to the property rights of home-sharers. It covered a broad range of relationships, including friends and relatives as well as married and unmarried couples. It focused on the complex legal principles which determine when, and to what extent, a person may claim an interest in property, and sought to formulate a straightforward, more certain scheme for ascertaining and quantifying property rights in the shared home. The Commission concluded that those who are living together should be encouraged to find out about the legal implications of doing so and to make express written arrangements setting out their intentions. "Sharing Homes" was the first seriously step to protect cohabitors' financial rights which was improved with others financial law reform : for example the Law Commission of July 2007 which considers the financial consequences of the ending of cohabiting relationships by separation or death.

This paper extends our knowledge of differences in children's well-being between cohabiting-parent and married-parent households over time by examining children's

3. Sharing homes : A discussion paper (2002) Law Com No 278, available at http ://www.lawcom.gov.uk/docs/lc278(1).pdf.

expenditure of married and cohabiting couples covering the period 1995-2007. Our analysis focuses on children's expenditure (education, toys and clothing) because much of the public policy debate over the increasing rates of cohabitation has centered on the implications for child poverty (e.g., Carlson and Danziger, 1999 ; Kenney, 2004). However, our analysis specially dedicate to children's clothing goods, this item is important for a child's physical well-being and emotional and cognitive development (Bradley and Corwyn, 2004). Consumer Expenditure Survey are used to study the evolution of marital status' effect on children's clothing demand covering the period 1995-2007. Then, a simple economic model that relates marital status to children's clothing demand is presented in this paper. We do not apply for a structural model to analyze the interaction between these two variables because of inter temporal changes of marital status. Before generalizing our findings, we should be cautious of unobserved differences between cohabiting-parent families and married-parent families which can affect spending patterns of household : Pseudo Panels approach can be one way to take account such omitted factors.

3.2 Previous research

Existing research tends to show that children in cohabiting-parent households do less well in a number of dimensions than children in married-parent households (Manning and Lichter, 1996 and Deleire and Khalil, 2005). However, the extent to which this follows from a causal relationship from marital status to adverse outturns is less clear. The fundamental question is whether it is marital status itself that makes the difference to children's lives and opportunities, or whether it is actually other factors that are correlated with marital status that drive the observed relationships. More recently evidence has emerged that marital status does have an independent effect on children's well-being after controlling for key aspects of family background (see Blandan, Gregg and Machin, 2002 and Gregg and Machin, 2000).

3.2.1 Marital status and parental resources

Marriage and cohabitation are highly selective of different socioeconomic groups (Lichter, McLaughlin, Kephart and Landry, 1992 ; Manning, 1994 and Oppenheimer, 1988). Stable employment, high earnings, and the completion of school are generally less highly associated with cohabitation than with marriage (Landale and Forste, 1991 ; Raley, 1993 ; Schoen and Weinick 1993 and Thornton, Axinn and Teachman, 1995). More precisely, and according to the 2009 American Community Survey conducted by the Census Bureau, cohabitation in US is more prevalent among those with less education : among women ages 19 to 44, 73% of those without a high school education have ever cohabited, compared with about half of women with some college (52%) or a college degree (47%). The result is that median household income is considerably lower among cohabiting couples than among married-couple families (Winkler, 1993). Parents allocate a significant amount of resources to their children, strongly affecting the children's well-being. It is no surprise that children from higher income households receive more resources from their parents than do children from lower income households. For instance, children from higher income households are more likely to attend art, music, dance, language, and computer classes outside of school than are children from lower income households (Brian, Lala and Robert, 2006). Using data from the 1990-92 American Consumer Expenditure Survey, Mark Lino finds that a low-income household with two children is expected to spend a total of $190,000 over an 18-year period on costs related to child rearing. The figure is higher for a higher income household : more than $380,000. Thus, in Lino's estimates, the total expenditure on children for a higher income family is twice as large as that for a low-income household. The ratio of the difference in expenditures on child care and education (not including education loans) is even greater : the average amount a higher income household spends on childcare and education is $38,220, while a low-income household spends $13,710, for a ratio of 2.79. Hence, low-income households spend a disproportionately smaller proportion of their expenditures on children, compared with higher income households.

However, to be confident that the effect of income has been accurately accounted requires more than controlling for earned resources. Unearned income (like pensions, social security and other public transfers) may well remain and can affect children's well-being. In particular, a potential correlation can take place between unearned income and marital status decision. This omitted effect can disappear using a good instrumentation for the last. Whereas, the problem of weak instruments still arises in the literature : El Lahga and Moreau (2007) show that using different instruments for marital status, such as the duration of the relationship, female-to-male age and education ratios, does not change the estimates. The task of controlling the influence of income from earned resources is therefore not straightforward.

3.2.2 Marital status and spouses' preferences

If marriage and cohabitation are substitutes and the choice of marital status could not be taken for granted, then it is important to identify the conditions under which some couples choose to marry, while others decide simply to cohabitate. According to Lyigun (2009), individuals' marital status are based on individuals' marital preferences and propensity to commit. Then individuals choose not only their (desired) marital status but their optimal modes of behavior. Indeed, all partners who prefer to act with commitment choose marriage, however, who are not able to commit and operate efficiently opt for cohabitation [4]. The most known example such costly commitment is the decision to have children, which might require more financial and emotional involvement by spouses. Furthermore, if we consider the decisions of a couple in a risky environment, risk preferences might be expected to play an important role in marital status decisions. As indicated in our theoretical chapter (chapter 2), risk preferences have a significant effect on marital status decision with highly risk-tolerant couple are more likely to choose cohabitation. It is clear that individuals' marital preferences endogenously change with the propensity to commit of couples and their risk tolerance.

4. We point to very similar results in Chapter 2.

This reverse causality could also bias our results. Because of these two omitted effects (unearned income and individuals' preferences), it is even more critical to understand the role that marital status play in children's well-being.

3.2.3 Marital status and cooperation

Cohabitations are usually shorter lived than marriages (Bourdais and al,2000 ; Milan, 2000 and Brien, Lillard and Stern, 2006), or there is consensus to admit that cooperation is more likely to occur in stable couples committed in a long term relationship. It comes as no surprise to the reader that cohabitations tend to dissolve more rapidly than marriages ; according to Milan (2000), more than 50 percent of all these unions end in dissolution within five years. Bourdais and al (2000) estimated that Canadian children whose parents are still cohabiting are three times more likely to experience a parental separation than those whose parents are married. In contrast to stable settings, cooperation is less likely for unmarried couples (Nordblom, 2004 and Stratton, 2005). Cohabitors were often described as less committed to the partnership and more focused on individual priorities compared with married people (Brown, 2000 ; Brown and Booth, 1996 ; Seltzer, 2000 and Waite and Gallagher, 2000). When spouses' preferences are egoistic, two household behavior's results are then possible : **(i)** Conjoints less invest in household public good (Bergstrom, Blume and Varian, 1986). we thus might expect that in a sample of couples with children, cohabitors would make spending choices that are associated with poorer (Bauman, 1999 ; Kenney, 2004 ; Lerman, 2002 and Oropesa, Landale and Kenkre, 2003). In particular, Oropesa and colleagues'study of mainland Puerto Rican families (2003) suggests that married fathers are more likely than cohabiting fathers to contribute their money to a common pot that both parents can draw from. **(ii)** Each household member specializes into specific tasks (Lundberg and Pollak, 1993). For instance, women can specialize in children's goods and men specialize in the other goods. These finding implies that children do better when their mothers control a larger fraction of family resources (Lundberg, Pollak and Wales, 1997) which is less

likely in cohabiting-parent household.

3.2.4 Marital status and children's characteristics

The clearest potential causal pathway between parents' formal marital status and children's characteristics is also early relationship quality. Indeed, children in cohabiting families are generally found younger than children living in other types of families (Manning and Lichter, 1996 and Omori, 2010). Children in cohabiting-couple live with fewer children (i.e., 2.1), on average, than children in any other family type. This undoubtedly reflects the high levels of instability within cohabiting family. Until recently, most studies that have compared children's characteristics in cohabiting and married parent families have failed to distinguish between biological and non-biological parents, although some new studies have shown that the large majority of children living with two biological parents are living with married parents rather than cohabiting parents. For example, 62% of children in US are living with two biological parents, yet, 95% of whom are living with married parents (Krista,2013).

3.3 Data and method

3.3.1 Data and sample

The availability and quality of data from UK has attracted a large number of empirical studies (Browning, Deaton and Irish, 1985 ; Atkinson and Cazes, 1990 ; Dauphin, Lahga, Fortin and Laccroix, 2008, among others). In our empirical analysis, we make use a survey covering the period 1995-2007, namely Family Expenditure Survey (FES). This is a cross sectional survey which collects information on household expenditures

on durable and nondurable goods, on the income and labor supply of members of the household, and on their socio-economic characteristics, with an initial sample of 80979 households.

The sample for the study includes two family types, cohabiting couples with children and married couples with children, whose size does not exceed 5 persons. A child includes biological, step-, and adopted children [5]. Cohabiting and married-couple households are two-parent households with no additional adult residing in them ; households with additional adults are excluded from the study. This selection drops 81.67 % of the initial sample. We further restrict our sample to households where adults are aged between 20-60 years, which excludes another 0.32 % of the sample. We drop households with children whose age is above 15 years, because these children may well be additional earners or may make decisions about expenditures for themselves. By this selection we drop 2.75 % of the initial sample. This selection leaves us with 12 363 households (15.26 % of the initial sample) composed of 10734 married-couple households and 1629 cohabiting households.

3.3.2 Measures

Budget information is collected via a questionnaire where respondents are asked to report expenditures on various goods. Three categories of expenditures are presented in the descriptive analysis that follows (section 3.4). These expenditures are weighted quarterly average expenditures for each household and then converted to weekly average expenditures. This helps to avoid too many zeros due to infrequency of purchase for some goods in our analysis. The three categories of expenditures are education, toys

5. FES data contain the variable which allows to distinguish between biological, step-, and adopted children. However, by imposing the constraint "children's age < 16 ", a large number of adopted children will be excluded from the seen sample because their age exceeds, in most part of the cases, 16 years.

and children's clothing. Any gift expenditures on items in these categories are excluded from the study. The expenditures are measured in Pounds Sterling. For education, all expenditures relating to educational expenses are included : fees/maintenance educational course, school trip, and the broad category "other educational expenses". Any educational expenditure that is not for the household's own child or children is excluded from the total educational amount. The second category, toys, comprises all children's game. Finally, the key goods in our analysis, children's clothing, encompasses boys', girls', and infants' clothing.

The key independent variables are the types of households described above. We also include price index and various socioeconomic and demographic characteristics of households and parents as control variables. Household characteristics are gross income and number of children. Parental characteristics [6] are parental education, age and employment. Other independent variables included in the study are environmental factors as time trend, region of the country and cohabitation rate. The last variable may serve as an instrument of household type if it satisfy the necessary empirical conditions [7]. Types of households are presented by a dummy variable. Price index is measured monthly at the country level. Household gross income provides the weekly income for each parent before tax. Parental education is measured by the number of schooling's years since the age of 6. Parental employment is measured by the number of weekly working hours. As regards region, we make the distinction between household living in London and those who live elsewhere (North, South, West, East). Finally, cohabitation rate is obtained directly from FES data using the percent of cohabiting households present in each cross section, with respect to the associated total population.

6. Parental characteristics are the reference persons' characteristics.
7. See Stock and Watson, 2011,Chap10.

3.3.3 Method

We consider a household i consisting of a male (m), a female (f) and children. let N_i be the number of children within household i. We consider $Cohabit$ as a dummy variable denoting the marital status of the couple, with $Cohabit = 1$ if cohabiting and 0 otherwise. The two partners can choose consensual union (cohabitation) or legal marriage. Each couple dedicates a part of there income $(y^m + y^f)$ for child-specific goods. There are several ways of taking into account marital status in the utility function. In Gray (1997), Lundberg and Rose (2002) and Couprie (2007), marital status is a predetermined variable ; the utility function at time t is a function of current marital status but is maximized with respect to consumption goods and leisure only. Alternatively, marital status can be seen as a reference parameter that may vary over time. Couples may move from cohabitation to marriage and this change can likely modify consumption on children's goods. In line with the second approach, the base specification is :

$$D^E_{i,t} = \ln(\frac{D_{i,t}}{N_{i,t}}) = \alpha_1 \cdot Cohabit_{it} + \beta_1 \cdot \ln \frac{y^m_{i,t} + y^f_{i,t}}{r_t} + \beta_2 \cdot (\ln \frac{y^m_{i,t} + y^f_{i,t}}{r_t})^2 + \gamma_1 \cdot \ln \frac{p_t}{r_t} +$$

$$\delta^{'} \cdot Z_{i,t} + \theta_i + \epsilon_{i,t} \tag{3.1}$$

where D denote the household demand on child-specific goods, N the number of children , then D^E is the Log demand per child, $(y^m + y^f)$ is the household income, p is the equivalent price index, r is a general price index, Z is a vector of socioeconomic and demographic household characteristics as indicated above, θ denote the individual effects[8], ϵ is a conformable error term, and α_1, β_1, β_2, γ_1 et $\delta^{'}$ are the parameters to be estimated. The subscript i indicates household and t indicates time.

8. As consequence of theoretical results in section 3.2, these individual effects can be eventually correlated with some explanatory variables. In section 3.4 we suppose that θ is exogenous. Results will be generalized in section 3.5 to consider endogenous context.

3.4 Results

3.4.1 Descriptive statistics results

Table 3.1 reports summary statistics on the characteristics of the families in our sample :

Expenditures on children's goods. Following Table 3.1, married households have the advantage in purchasing over cohabiting household for most categories. When married-couple household spent money, they spent more than cohabiting households. For children's clothing expenditures, married-couple households spent a weekly average of 13 Pounds while cohabiting households spent only 9 Pounds. Similarly, average weekly expenditures on education were higher among married-couple households than cohabiting households. On average, married-couple households spent 11 pounds weekly on education while the amounts spent by cohabiting households were approximately 4 Pounds [9]. However, unlike expenditures on clothing and education, weekly expenditures on children's games were similar between married-couple (4.5 Pounds) and cohabiting (4.37 Pounds) households.

Socioeconomic and Demographic Characteristics of Households. Descriptive statistics of the samples presented in Table 3.1 shows that socioeconomic and demographic characteristics are different across different types of household. For example, parents of children in cohabiting couple families are more likely to be young, poorly educated, and unemployed than their counterparts in married-couple families. The average of cohabiting persons whose age is less than 30 years is approximately 29 percent for men and 45 percent for women, whereas, just 8 (16) percent of married men (women) were aged less than 30 years ; older couples consider marriage as the ideal form for

9. One interpretation of this finding is that children living in cohabiting family are so younger than children living in married families, hence, their educational expenses are so weak.

Parameter	Married	Cohabiting
Number of households	10734	1629
Weekly children's expenditures (Pounds Sterling)		
Clothing	12.968	9.330
Education	11.661	4
Toys	4.504	4.377
Age (percent)		
Men less than 30 years	8.54	29.09
30-39 years	51.04	49.55
40 or more years	40.42	21.36
Women less than 30 years	16.04	45.47
30-39 years	57.46	42.8
40 or more years	26.5	11.73
Education (percent)		
Men less than 12 years	54.35	67.73
12 years	9.63	9.77
13-15 years	16.18	13
16 or more years	19.84	9.5
Women less than 12 years	45.36	59.55
12 years	12.87	11.65
13-15 years	23.15	20.5
16 or more years	18.62	8.3
Weekly work hours (percent)		
Unemployed men	21.55	29.34
less than 35 hours	3.56	3.87
35 or more hours	74.89	66.79
Unemployed women	33.14	38.73
less than 35 hours	45.89	38.24
35 or more hours	20.97	23.02
Mean gross weekly income (Pounds Sterling)		
Men	513.75	372.91
Women	204.7	171.95
Number of children		
Boys 0-2	0.185	0.307
Girls 0-2	0.183	0.274
Boys 3-5	0.197	0.18
Girls 3-5	0.184	0.17
Boys 6-15	0.553	0.331
Girls 6-15	0.514	0.308
Region		
North	37.73	37.91
South	24.07	22.65
West	15.76	16.78
East (except London)	13.55	14.34
London	8.89	8.31

TABLE 3.1 – Descriptive statistics of households with children, Family Expenditure Survey, 1995-2007

their union. Nevertheless, both cohabiting and married women begin to live in couple earlier than men and make proportionally more often conjugal experience. However, we can not neglect the cohort effect which strongly marks data ; while for older generations marriage marked the beginning of life for most couples, the cohabitation is gradually became the standard form of family formation. Men and women decide more frequently to start their first union outside of a formal marriage. As regards educational attainment, about 19.8 (18.6) percent of married men (women) were with a high school diploma. In contrast, only 9.5 (8.3) percent of men's (women's) cohabitors had a higher degree. With regard to employment, not surprisingly, married couples are more employed than cohabiting couples ; while the percent of men's and women's employment in married couples are 78.45 and 66.86 respectively, this drops to 70.66 and 61.27 respectively in cohabiting couples. However results show also that active women are frequently unmarried ; more than 23 percent of cohabiting women work at full time while just 20 percent for married women. One interpretation is that, at the time of birth of their child, married women stop temporarily their professional activity. These parental employment patterns translate into distinct income levels for children in each family type. The mean household income is considerably lower among cohabiting couples (543 Pounds Sterling) than among married-couple families (717 Pounds Sterling). Thus, children living with unmarried couples may have fewer household resources and may depend to a greater extent on public assistance than children in married-couple families. Finally, we turn to the characteristics of the children themselves. Children in cohabiting families are generally younger than children living in other types of families.

3.4.2 Ordinary least squares regression results

Because the differences in children's expenditures can be a result of differences in socioeconomic and demographic characteristics across household types, multivariate analyses were conducted. The effect of parents' marital status and any given socioeconomic and demographic characteristics was estimated by ordinary least squares analysis for

the three types of children's goods, however, our analysis specially dedicate to children's clothing goods.

(1) Clothing. The results of ordinary least squares regression analyses for the expenditure category of clothing are presented in Table 3.2. We start with an extremely parsimonious specification and add extra parameters until we find a satisfactory fit. The first model we estimate (**Model I**) include only clothing price and household characteristics. The results are given in the first column of Table 3.2 below. As can be seen, clothing price, household income, children and marital status were found to be significant predictors of demand on children's clothing [10]. It is no surprise to the reader that clothing price and demand are negatively correlated : when clothing price increase 1 percent, demand on children's clothing decrease approximately by 5 percent. Children's clothing demand is positively related to income and its quadratic term : clothing is a normal luxury good. In addition, the number of children correlate negatively with children's clothing demand ; an additional child decreases clothing demand by 1.7 percent. However, results in Tables 3.2 and 3.3 show also that boys and girls do not benefit from the same consumption and are not characterized by the same well-being : parents are found to spend significantly more on girls' clothing than boys' clothing. This result confirms the intuition of Lundberg and Rose (2003), among others, that the gender of children is a significant variable to explain household purchases. The main result in this first specification is that demand on children's clothing differ among married and cohabiting households : household type is thus a significant predictor of children's clothing demand. The regression results show that cohabiting households were significantly less likely to spend on children's clothing than married-couple households. The interpretation of these findings is already identified in the theoretical section of this paper [11].

10. We have tried another indicator of family resources and allow "the difference between the log of the wife and the husband's income" to influence demand on children's clothing, however, results associated to this variable was been not satisfactory.

11. cf.Previous research

Parameter	Model I	Model II	Model III	Model IV
Constant	7.594***	6.509***	19.023***	18.967***
	(0.419)	(0.800)	(2.516)	(2.516)
Clothing price	-4.896***	-4.816***	-22.787***	-22.840***
	(0.327)	(0.332)	(3.252)	(3.252)
Cohabit	-0.773***	-0.489**	-0.480*	0.062
	(0.241)	(0.250)	(0.250)	(0.664)
Household gross income	0.622*	0.414	0.436	0.437
	(0.332)	(0.360)	(0.360)	(0.361)
Household gross income^2	0.355***	0.397***	0.394***	0.392***
	(0.093)	(0.097)	(0.098)	(0.098)
Number of Children	-1.716***	-1.696***	-1.694***	-1.688***
	(0.130)	(0.133)	(0.133)	(0.133)
Number of girls	0.695***	0.681***	0.679***	0.676***
	(0.118)	(0.119)	(0.119)	(0.119)
Men's age		0.026	0.025	0.025
		(0.018)	(0.018)	(0.018)
Women's age		0.063***	0.063***	0.063***
		(0.02)	(0.019)	(0.019)
Men's education		-0.027	-0.027	-0.026
		(0.036)	(0.036)	(0.036)
Women's education		-0.145***	-0.142***	-0.142***
		(0.041)	(0.041)	(0.041)
Men's work hours		-0.003	-0.003	-0.003
		(0.004)	(0.004)	(0.004)
Women's work hours		0.016***	0.016***	0.017***
		(0.005)	(0.005)	(0.005)
Cohabitation rate			0.154*	0.164**
			(0.081)	(0.081)
Trend			-1.363***	-1.378***
			(0.248)	(0.248)
London			-0.010	-0.009
			(0.309)	(0.309)
Trend*Cohabit				-0.169
				(0.119)
Dummy2002*Cohabit				1.723**
				(0.839)
R-squared	0.0563	0.0626	0.0650	0.0653

(1) Estimated parameters, as well as their standard errors, increase hundredfold.
(2) P-values of parameters : * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 3.2 – Ordinary least squares regression results : estimates of children's clothing demand, Family Expenditure Survey, 1995-2007

Parameter	Couples with one child	Couples with two children	Couples with three children
Clothing price	-20.547***	-25.06***	-23.429***
	(6.616)	(4.104)	(5.931)
Cohabit	-0.361	-0.8**	-0.098
	(0.438)	(0.357)	(0.506)
Household gross income	0.659	0.225	0.434
	(0.633)	(0.508)	(0.745)
Household gross income^2	0.427**	0.471***	0.106
	(0.179)	(0.134)	(0.200)
Number of boys	14.544***	9.127***	4.930***
	(5.066)	(1.598)	(1.523)
Number of girls	15.852***	9.756***	5.224***
	(5.075)	(1.598)	(1.519)
Men's age	0.069**	-0.007	0.001
	(0.033)	(0.023)	(0.035)
Women's age	0.031	0.091***	0.045
	(0.036)	(0.027)	(0.040)
Men's education	-0.023	-0.040	0.021
	(0.074)	(0.045)	(0.071)
Women's education	-0.177**	-0.161***	0.042
	(0.081)	(0.052)	(0.079)
Men's work hours	0.002	-0.011*	0.010
	(0.010)	(0.006)	(0.008)
Women's work hours	0.019*	0.011	0.024**
	(0.011)	(0.007)	(0.011)
Cohabitation rate	0.126	0.172*	0.162
	(0.168)	(0.102)	(0.148)
Trend	-1.156**	-1.534***	-1.489***
	(0.505)	(0.312)	(0.455)
London	0.264	-0.222	-0.004
	(0.621)	(0.394)	(0.565)

(1) Estimated parameters, as well as their standard errors, increase hundredfold.
(2) P-values of parameters : * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 3.3 – Ordinary least squares regression results : estimates of children's clothing demand of different demographic groups, Family Expenditure Survey, 1995-2007

To specify the contribution of each spouse, within the same household, on children's clothing demand, **Model II** adds some parental characteristics. The regression results indicate that young two-parent households were found to spend significantly less on children's clothing than other two-parent households. However, women's age was found to be more significant predictors of children's clothing expenditures than those of men. As regards education, parents with a high school diploma were less likely to spend on children's clothing than were parents without a high school diploma. Omori (2010) find that parents college-educated parents spent 13% more on children's entertainment than parents with a high school diploma. Thus, attaining a higher education leads parents to spend less on their children's clothing. However, as indicated above for the factor age, women's education was also found to be more significant predictor of children's clothing demand than those of men. While men's work hours did not have an impact on children's clothing demand, women's works hours was a relevant factor of children's well-being : when women's work hours increase 1 percent, demand on children's clothing increase by 0.016 percent. According to the second specification (**Model 2**), women's characteristics (as age, education, work hours..) are more significant of children's clothing demand than those of men. This result confirms our intuition in an other paper that children represent a cost for the parents but it seems that this cost is essentially supported by women. The inclusion of some parental characteristics didn't induce big changes in the other parameters, therefore marital status remain a determinant factor of children's clothing demand. This result is similar to those of Thomas DeLeire and Ariel Kalil (2005) who show that cohabiting-parent families tend to spend more on adult goods such as alcohol and tobacco and less on potentially child-related goods. Whereas Omori (2010) find that expenditures on children's apparel does not differ among married and cohabiting households. This difference can be of a selection problem [12] or may be because data used by DeLeire and Khalil were from 1982 to 1998 while the data used by Omori were the most recent Consumer Expenditure Interview Surveys data (2007-2008). The second

12. The study of Deleire and Khalil did not use the direct measure "cohabiting partner" to identify cohabiting households, whereas the current CE gives the identifier for a cohabiting partner in its member file.

alternative suggest that the effect of marital status may be changed over time. This change can be the result of several environmental factors.

There is extensive academic literature on the links between household consumption and environmental impacts(Christoffersen et al, 2005 ; Munksgaard et al, 2005 and Turner et al, 2007). Cohabitation rate, trend and region, are then driving forces that may affect children's clothing demand. The estimated coefficients of **Model III** show that residing in London or elsewhere, has not a significant impact on children's clothing demand. One interpretation of these findings is that cohabitation is became an important family form to consider in every region of UK. The fact that cohabitation rate and trend has a significant effect on children's clothing demand seems to indicate it. The intuition of using cohabitation rate in demand equation was to serve as an instrument for marital status and then solve bias problems indicated in the theoretical section of this paper. Nevertheless, the associated estimated coefficient show that cohabitation rate can significatively affect couples' preferences and thus cannot be used as instrument. Following these findings, there is a need to study the evolution of marital status' effect in order to assess how household type affect children's clothing demand covering the period 1995-2007.

Results associated to **Model IV** confirm our intuition that marital status effect's has changed over time ; following the variable "Trend*Cohabit" difference in children's well-being across household types decrease over time. More precisely, the variable "Dummy2002 *Cohabit" [13] show that children in married-couple households are no more advantaged than children in cohabiting households since the year 2002. Results exposed in Table 3.4 seems to confirm these results and thus the year 2002 may be the "break point" [14] of marital status' evolution. Formally, to test the presence of structural change in the selected model we use the Chow test. The Chow breakpoint test compares the sum of squared residuals obtained by fitting a single equation to the entire sample with the

13. Dummy2002 is a dummy variable which take value 1 since 2002 and 0 otherwise.
14. The year from which marital status is no more a significant determinant of children's well-being.

Parameter	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Constant	33.260***	7.055	3.500	20.485***	22.253***	13.812***	11.913**	12.438***	15.859***	3.686	7.582*	5.913	-2.541
	(8.321)	(7.157)	(7.753)	(5.263)	(7.532)	(4.325)	(5.061)	(3.864)	(4.809)	(3.650)	(4.389)	(4.190)	(7.525)
Clothing price	-42.913***	-4.190	-0.597	-29.357***	-41.013***	-32.901***	-25.744*	-27.666**	-68.788***	-41.941**	-60.251**	-87.982***	-65.559*
	(12.365)	(11.153)	(12.771)	(9.730)	(15.746)	(9.476)	(14.463)	(12.715)	(24.306)	(17.986)	(23.688)	(22.147)	(38.285)
Cohabit	**-1.289***	**-0.173**	**-0.441**	**-1.359****	**-0.178**	**-1.391***	**-1.602***	**-0.750**	**1.404**	**0.240**	**0.009**	**-1.437**	**0.723**
	(0.747)	(0.636)	(0.843)	(0.590)	(0.805)	(0.788)	(0.992)	(0.890)	(0.954)	(1.024)	(1.220)	(1.053)	(1.354)
Household gross income	0.265	0.701	0.015	1.107	0.533	2.286**	-1.116	-0.360	-1.286	2.964*	0.462	-4.259*	1.430
	(0.786)	(0.674)	(0.986)	(0.855)	(1.344)	(1.101)	(1.148)	(1.285)	(1.765)	(1.654)	(2.633)	(2.559)	(3.459)
Household gross income^2	0.461*	0.382*	0.655**	0.072	0.424	-0.161	0.650**	0.684**	0.956**	-0.615	0.081	2.059***	0.824
	(0.250)	(0.220)	(0.311)	(0.227)	(0.358)	(0.308)	(0.291)	(0.341)	(0.436)	(0.434)	(0.620)	(0.723)	(0.954)
Number of children	-1.619***	-0.571*	-2.023***	-1.093***	-2.031***	-2.001***	-1.026*	-1.910***	-2.001***	1.526***	-2.374***	-1.565**	-3.248***
	(0.340)	(0.297)	(0.386)	(0.293)	(0.422)	(0.423)	(0.562)	(0.482)	(0.555)	(0.560)	(0.680)	(0.621)	(0.817)
Number of girls	0.543*	0.292	0.786**	0.359	0.840**	0.862**	0.926*	0.583	0.380	0.311	1.245**	0.054	1.596**
	(0.301)	(0.273)	(0.347)	(0.265)	(0.378)	(0.377)	(0.495)	(0.445)	(0.475)	(0.488)	(0.604)	(0.575)	(0.729)
Men's age	0.048	0.008	0.021	0.016	0.036	0.077	-0.051	0.007	-0.013	0.046	0.053	0.090	0.007
	(0.050)	(0.041)	(0.054)	(0.041)	(0.061)	(0.057)	(0.078)	(0.062)	(0.071)	(0.073)	(0.090)	(0.082)	(0.109)
Women's age	-0.042	-0.0272	0.043	-0.022	0.092	0.043	0.169**	0.151**	0.08	0.172**	-0.006	0.092	0.089
	(0.055)	(0.045)	(0.060)	(0.045)	(0.067)	(0.065)	(0.085)	(0.069)	(0.076)	(0.081)	(0.097)	(0.091)	(0.117)
Men's education	-0.031	-0.082	0.197*	-0.158*	0.096	0.119	-0.235	-0.152	-0.05	0.029	0.106	-0.235	0.037
	(0.093)	(0.090)	(0.109)	(0.083)	(0.120)	(0.119)	(0.154)	(0.139)	(0.143)	(0.147)	(0.183)	(0.161)	(0.208)
Women's education	-0.020	-0.036	-0.182	0.067	-0.309**	-0.183	-0.002	-0.187	0.059	-0.240	-0.148	-0.396**	-0.237
	(0.116)	(0.099)	(0.131)	(0.096)	(0.135)	(0.130)	(0.170)	(0.147)	(0.163)	(0.164)	(0.199)	(0.180)	(0.221)
Men's work hours	0.002	-0.011	-0.004	-0.003	-0.009	-0.004	0.011	-0.025	-0.02	0.007	0.021	0.016	-0.021
	(0.011)	(0.010)	(0.013)	(0.011)	(0.016)	(0.014)	(0.019)	(0.017)	(0.018)	(0.020)	(0.024)	(0.023)	(0.030)
Women's work hours	0.009	0.033**	0.003	0.014	0.019	0.012	0.059**	-0.017	0.025	0.013	0.014	0.005	0.013
	(0.014)	(0.013)	(0.017)	(0.013)	(0.019)	(0.018)	(0.022)	(0.020)	(0.023)	(0.025)	(0.029)	(0.028)	(0.035)
London	0.691	0.332	-0.527	-0.998	-0.899	1.327	-0.538	1.352	0.146	0.589	-0.680	-3.117	-1.188
	(0.702)	(0.606)	(0.875)	(0.625)	(0.726)	(0.940)	(1.237)	(1.059)	(1.155)	(1.243)	(1.481)	(2.433)	(1.760)

TABLE 3.4 – Ordinary least squares regression results : estimates of children's clothing demand by Cross Section, Family Expenditure Survey, 1995-2007

Break Point	F-statistic	Probability
2001	2.09	0.02
2002	**2.6**	**0.003**
2003	2.01	0.02
2004	1.75	0.04

TABLE 3.5 – Chow break point test output

sum of squared residuals obtained when separate equations are fit to each sub sample of the data (e.g. before 2002 and after 2002). The null hypothesis is $b_i = \beta_i$, that is, there is no difference in the coefficients obtained from the two samples.

At 1% level of significance, the null hypothesis should be rejected for the year 2002 (Table 3.5). The relevant conclusion is that the sub-samples, before and after 2002, are significantly different ; there is significant difference in determinants of children's clothing demand before and after 2002. The main implication of these findings is that marital status effect's on children's clothing demand is changed before and after 2002.

These findings agree with the theories advocated by financial reform adopted by British authorities since 2002 to date. It was recommended that government must consider legal remedies to provide a protection for cohabitors' financial rights. These remedies can improve the degree of cooperation within cohabiting families and thus increase expenditures on children's goods. Therefore, marital status was a significant determinant of children's clothing demand during the pre-reform era. After 2002, when the reform process had taken off, we see the difference in children's clothing demand is became less strong between married-couple and unmarried households. This shows that the level of children's clothing demand within cohabiting household, was responding to the doses of financial law reform during the post reform era to date. Clothing regression results developed above can be used to solve paradoxical results of Deleire and Khalil (2005) and Omori (2010). Difference between these two analyzes can be simply a result of the evolution of marital status' effect in American regions.

(2) Education And Toys. Perhaps surprisingly, the results developed above for expenditure category of clothing are not valid for education and toys expenditures. The results of ordinary least squares regression analyzes for education and toys expenditures are presented in Table 3.6. No significant expenditure difference across different household types was found after controlling for other variables : education and toys expenditures for married-couple households did not vary significantly from that for unmarried households over time (before and after 2002). The associated estimated coefficient of variable "Dummy2002*Cohabit" seems to indicate it. With respect to toys' expenditures, regression results found are, in reality, in coherence with descriptive statistics which indicate that weekly expenditures on children's game are similar between married-couples and cohabiting couples. Also, regression results associated to education's expenditures are similar to those of Omori (2010) who found that unmarried households in US spent no more or less on education than did married-couple households [15]. Instead, children, household income, and parental's characteristics (as age, education, work hours..) were found to be significant predictors of education and toys expenditures.

3.5 Additional results

3.5.1 Pseudo panels approach

Thus far, we have considered that being married or cohabiting can be regarded as exogenous. However, as indicated in the theoretical section, the differences of behavior observed between married persons and cohabitants can not be due to the marital status but to unobservable variables (e.g., unearned income and spouses' preferences) which would explain this status. In other words, a possible correlation can take place between the individual effects θ_i and the dummy variable $Cohabit_{i,t}$. This would lead to an

15. Our analysis is thus valid only for clothing goods ; it may be rather interesting to extend it to others children's goods.

Parameter	Toys Expenditures	Education Expenditures
Constant	6.057**	96.265**
	(1.131)	(48.185)
Equivalent price	-2.551***	-24.140**
	(0.803)	(11.228)
Cohabit	-0.279	0.131
	(0.449)	(1.571)
Household gross income	0.526**	-3.599***
	(0.252)	(0.880)
Household gross income^2	0.163**	3.219***
	(0.068)	(0.240)
Number of children	-0.697***	-1.602***
	(0.095)	(0.333)
Number of girls	-0.146*	0.190
	(0.085)	(0.298)
Men's age	-0.012	0.139***
	(0.013)	(0.045)
Women's age	-0.036***	0.054
	(0.014)	(0.049)
Men's education	-0.017	0.580***
	(0.026)	(0.092)
Women's education	0.023	0.130
	(0.029)	(0.103)
Men's work hours	-0.003	-0.050***
	(0.003)	(0.011)
Women's work hours	-0.009**	-0.036**
	(0.004)	(0.014)
Cohabitation rate	-0.106*	0.164
	(0.061)	(0.229)
London	-0.163	2.305***
	(0.206)	(0.719)
Trend*Cohabit	0.073	0.124
	(0.079)	(0.279)
Dummy2002*Cohabit	-0.081	-2.597
	(0.568)	(1.969)

(1) Estimated parameters, as well as their standard errors, increase hundredfold.
(2) P-values of parameters : * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 3.6 – Ordinary least squares regression results : estimates of children's toys and education demand, Family Expenditure Survey, 1995-2007

inconsistent and biased estimator. If the problem of weak instruments still arises in the literature, panel data provide opportunities to correct these biases, since omitted variables remain constant within the same household. The within and first difference operators estimated with panel data can cancel the individual specific effects. Obviously, when repeated observations on the same individuals are not available, such an approach cannot be used.

Deaton (1985) suggests the use of cohorts to obtain consistent estimators when repeated cross-sections are available (e.g FES data), even if θ_i is correlated with one or more of the explanatory variables. Let us define C cohorts, which are groups of individuals sharing some common characteristics. These groups are defined such that each individual is a member of exactly one cohort, which is the same for all periods. It is important to realize that the variables on which cohorts are defined should be observed for all individuals in the sample. This rules out time-varying variables (e.g. earnings), because these variables are observed at different points in time for the individuals in the sample.

Since individual observations are split into C cohorts, we aggregate all observations to cohort level, the resulting model can be written as

$$\bar{D}^E_{ct} = \bar{x}_{ct}.\beta + \bar{\theta}_{ct} + \bar{\epsilon}_{ct}, \tag{3.2}$$

$$c = 1, 2.....C, t = 1, 2.....T$$

where $\bar{D}^E_{ct}$ is the average value of all observed D^E_{it}'s in cohort c in period t, and similarly for the other variables in the model. The resulting data set is a pseudo panel or synthetic panel with repeated observations over T periods and C cohorts. The main problem with estimating β from (2) is that $\bar{\theta}_{ct}$ depends on t, is unobserved, and is likely to be correlated with $\bar{x}_{ct}$ (if θ_i is correlated with x_{it}). Therefore, treating $\bar{\theta}_{ct}$ as part of the random error term is likely to lead to inconsistent estimators. Alternatively, one can treat $\bar{\theta}_{ct}$ as fixed unknown parameters assuming that variation over time can be ignored

($\bar{\theta}_{ct} = \bar{\theta}_c$). If cohort averages are based on a large number of individual observations, this assumption seems reasonable and a natural estimator for β is the within estimator on the pseudo panel (Verbeek and Nijman, 1992).

If the number of observation per cohort is not large, we consider the cohort population version of (3.2),

$$D_{ct}^{E*} = x_{ct}^{*}.\beta + \theta_c + \epsilon_{ct}^{*} \tag{3.3}$$

where the asterisks denote the unobservable cohort population means, and θ_c is the cohort fixed effect, which is constant over time because population cohorts contain the same individuals in all periods. Now $\bar{D}_{ct}^{E}$ and $\bar{x}_{ct}$ can be considered as error-ridden measurements of D_{ct}^{E*} and x_{ct}^{*}. It is assumed that the measurement errors are normally distributed with zero mean, independent of the true values,

$$\begin{pmatrix} \bar{D}_{ct}^{E} - D_{ct}^{E*} \\ \bar{x}_{ct}^{'} - x_{ct}^{*'} \end{pmatrix} \sim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix} ; \begin{pmatrix} \sigma_{00} & \sigma^{'} \\ \sigma & \Sigma \end{pmatrix} \right) \tag{3.4}$$

In general, the measurement error variances depend on the number of observation within each cohort. Assuming, for convenience, that there are n_c observations available in each cohort for each period, the measurement errors tends to zero if $n_c \to \infty$. For any construction of cohorts, σ_{00}, σ and Σ can be estimated consistently from the individual observations. Once estimates for Σ and σ are available, Deaton proposes the following error in variables estimator

$$\hat{\beta} = (X' \cdot X - CT \cdot \Sigma)^{-1} \cdot (X' D^{E} - CT \cdot \sigma) \tag{3.5}$$

3.5.2 Pseudo panels results

The next set of analyses uses pseudo panels approach to estimate demand on children's clothing. For the construction of British pseudo panels, we can widened with the

classic procedure of household grouping [16] and proposed an RBS grouping (Region, year of Birth of household head and year of Survey) in which we apply only invariant and observed criteria. The simultaneous application of several criteria has for main object the creation of a largest number of homogeneous cohorts. Applying RBS criteria for FES data covering the period 1995-2007 lead to the construction of 72 cohorts which size does not exceed 50 in most case. The grouping of households (i,t) in the cells (c,t) gives rise to the exact aggregated model [17] :

$$(\ln \frac{D}{N})_{c,t} = \alpha_1 \cdot Cohabit_{ct} + \beta_1 \cdot (\ln \frac{y^m + y^f}{r})_{ct} + \delta' \cdot Z_{c,t} + \gamma_1 \cdot (\ln \frac{p}{r})_{ct}$$

$$+\theta_{c,t} + \epsilon_{c,t} \tag{3.6}$$

In this specification, the vector of socioeconomic and demographic household characteristics $Z_{c,t}$ includes ; number of children, age, education, weekly work hours, region and trend's dummy variable. Using the RBS criteria for cohorts construction and applying Deaton's errors-in-variables estimator, the effect of any given socioeconomic and demographic characteristics was estimated, the results of which are presented in Table 3.7. As can be seen, clothing price and children were found to be significant predictors of the aggregated children's clothing demand. Parental characteristic's are also significant determinants of the aggregated children's clothing demand. The main result in this specification is that the aggregated demand on children's clothing differ among married and cohabiting households : on average, cohabiting households are significantly less likely to spend on children's clothing than married-couple households. These findings agree in general with all results developed above using cross section data. However, it is difficult to describe the evolution of marital status effect's on children's clothing demand using pseudo panel data.

16. The most obvious criteria in the literature is an age cohort.
17. Just for simplification reasons, we have dropped income's quadratic term.

Parameter	**Estimate**
Cohabit	-0.540***
	(0.027)
Household Gross income	0.061***
	(0.012)
Clothing Price	-0.393***
	(0.042)
Number of children	0.526***
	(0.020)
Age of household head	-0.061***
	(0.002)
Education of household head	0.070***
	(0.003)
Weekly work hours of household head	0.005***
	(0.0006)
London	-0.095***
	(0.017)
Dummy2002*Cohabit	0.020
	(0.025)
P-values of parameters : * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$	

TABLE 3.7 – Pseudo panels regression results : estimates of children's clothing demand, Family Expenditure Survey, 1995-2007

3.6 Conclusion and discussion

Using the Family Expenditure Surveys, this article has examined the differences in children's expenditures relating to children's well-being between cohabiting-parent and married-parent households covering the period 1995-2007. The main focus was to explore if marital status is still a significant determinant of children's well-being in UK. First, descriptive statistics presented showed that parents of children in cohabiting couple families are more likely to be young, poorly educated, and unemployed than their counterparts in married-couple families : the socioeconomic environment of children living with a married parent appears to be better than children living with cohabiting parents.

However, multivariate regression analysis revealed that these differences are due mainly to differences in household and parental characteristics and some environmental factors. First, the article examined demand on children's clothing. We start with an extremely parsimonious specification and add extra parameters until we find a satisfactory fit. The first specification show that children's clothing demand is positively related to income and its quadratic term and so we conclude that clothing is a normal luxury good. Results revealed also that the number of children correlate negatively with children's clothing demand. However, it was shown that boys and girls do not benefit from the same consumption and are not characterized by the same well-being : parents are found to spend significantly more on girls' clothing than boys' clothing. The main result of this first specification is that married-couple households are significantly more likely to spend money on children's clothing than are cohabiting households. The second specification of our model show that women's characteristics (as age, education, work hours..) are more significant of children well-being than those of men. This result confirms the intuition that children's cost is essentially supported by women. The inclusion of some parental characteristics didn't induce big changes in the other parameters, therefore marital status remain a significant determinant of children's clothing demand.

The result of the third specification imply that cohabitation rate significatively affect adult's preferences. However, region was found to be not statistically significant of children's well-being : one interpretation of these findings is that cohabitation has become an important family form to consider in every region of UK.

Cross section results show also that the effect of marital status on children's clothing demand has changed over time : since the year 2002 no difference in children's clothing demand is found between married-couple and unmarried households. Crossed variables and Chow test were used to verify the presence of structural change in the selected model before and after 2002. Results indicate that difference in children's clothing demand is became less strong between married couple and cohabiting household with the introduction of a financial law reform in July 2002. Clothing regression results developed above can be used to solve paradoxical results of deleire and Khalil (2005), who show that cohabiting-parent families tend to spend more on adult goods and less on potentially child-related goods, and Omori (2010) who find that expenditures on children's apparel does not differ among married and cohabiting households. Difference between these two analyzes can be simply a result of the evolution of marital status' effect in American regions.

Perhaps surprisingly, the results developed above for expenditure category of clothing are not valid for education and toys expenditures. Results show that education and toys expenditures for married-couple households did not vary significantly from that for unmarried households over time (before and after 2002). Finally, if we want to take into account of omitted variables (unearned income and spouses' preferences) in the regression, we can use pseudo panels approach proposed by Deaton (1985). Pseudo panels results for expenditure category of clothing are generally in coherence with those developed using cross section data.

Chapitre 4

Children's cost in collective households : theory and empirical evidence from the UK.

Abstract : Following the principle of the Rothbarth approach, we estimate the cost of children, i.e., the share of household income accruing to children. Our method differs from this traditional approach in that it is consistent with the existence of economies of scale. It also generalizes the approach suggested by Bargain and Donni (2012). Moreover, it allows measuring cost of children respectively borne by each parent in the household. We illustrate the method with an application on data drawn from a series of U.K. Family Expenditure Surveys.

4.1 Introduction

Evaluating what parents spend on children has long been on the agenda of economists. The Rothbarth method, one of the most common methods used to measure the cost of children, consists in imputing the same level of welfare to parents in different households that have the same level of expenditure on some adult-specific goods, and deriving from this the fraction of household total expenditure devoted to children. The underlying intuition is that the welfare of parents is a monotonic increasing function of their consumption of adult-specific goods. Because of its simplicity, the Rothbarth method has inspired several authors as Lazear and Michael (1988), Deaton, Ruiz-Castillo and Thomas (1989), Gronau (1991) and Tsakloglou (1991). Importantly, among the contributions listed above, rare are the ones that explicitly estimate the fraction of children costs respectively borne by each parent in the household.

The present paper is easily positioned in this literature. Specifically, we propose a new method to evaluate the cost of children which is consistent with economies of scale and parental bargaining. It can be seen as a generalization of the traditional Rothbarth approach. We consider a model where each individual (including children) has a specific utility function and suppose that the outcome of the decision process is Pareto efficient. This characterizes the collective approach (Chiappori, 1988, 1992). Economies of scale are then represented by a function of current prices only that modifies the implicit price of the aggregate good. This modification may represent complete or partial public consumption or even externalities. Identifying assumptions are twofold : (a) the traditional condition that individual preferences do not depend on the demographic structure and (b) a simple, rather weak condition on how the cost of children is affected by total expenditure. The cost of children can then be identified from the observation of two adult goods (one for each spouse living in the household) and one aggregate good.

Our approach is closely related to the most recent developments of the literature on collective models. In particular, Bargain and Donni (2012) and Bargain et al. (2014) also consider a collective model incorporating economies of scale and parents' bargaining. Nonetheless, economies of scale are represented by a simple Independent-of-the-Base scale that translates total expenditure, as was previously suggested by Lewbel and Pendakur (2008). The identification of the cost of children does not exploit variation in prices but relies on the strong assumption that individuals shares of total expenditure are independent of the level of total expenditure. Our representation of economies of scale exploits the variation in prices and is more closely related to what is made by Browning et al. (2013). These authors suggest a general representation of economies of scale using a price transformation à la Barten. This transformation reflects the degree of publicness or privateness associated with each good within the household. Nevertheless, contrary to us, Browning et al. ignore children. They also suppose that the price transformations are represented by constants, the same for each person in the household. Our approach is more general here too.

In the empirical application, we exploit the U.K. Family Expenditure Survey over the period 1988-2007, and suppose that household expenditures on some male and female clothing can be seen as adult-specific. We then estimate a system of two budget share equations (the aggregate expenditure equation is removed) in order to identify the individual shares of total expenditure and the household economies of scale and consider several specifications. The results indicate that children command a reasonably large share of resources, roughly 15 percent for the first child, and that this share rises with the number of children, around 12 percentage points per additional child. Yet mothers seem to sacrifice more resources than fathers to their children. They also show that scales are reasonable in magnitude for both spouses, but economies of scale are quite large. Lastly we test the robustness of these results by modifying the definition of economies of scale and by focusing on specific parts of the sample. Robustness tests confirm our first results.

The paper contains five sections. The second and third sections present the theoretical and the empirical models, respectively. The fourth section presents the results, and the fifth section concludes.

4.2 Theoretical framework

This section describes the proposed collective model of consumption. To begin with, we suppose that there are three types of households. Let h denote the type, with $h = 1$ for single adults, $h = 2$ for childless couples and $h = 3$ for couples with children. Individual types are indexed by subscript i and, by convention, we suppose that $i = m$ indicates men, $i = w$ women and $i = c$ children.

4.2.1 Singles

We start with the standard consumption model of a single-adult household ($h = 1$). We simply suppose that each household member i ($= m$ or w) has a twice continuously differentiable, strictly increasing and strictly concave direct utility function $U_i = U_i(x_i, X)$ over one exclusive good x_i and one aggregate consumption good X. The quantities of the exclusive and aggregate goods that are purchased by the individual i are denoted by z_i and Z, respectively, and the budget constraint is

$$z_i p_i + Z = y_i \tag{4.1}$$

where p_i is the market price for the exclusive good and y the total household expenditure. The market price for the aggregate good is normalized to one. The purchased goods

coincide, as it is natural here in a single-person household,[1] with consumed goods :

$$z_i = x_i \text{ and } Z = X. \tag{4.2}$$

Individual i then faces the following optimization program :

$$\max U_i\left(x_i, X\right) \tag{4.3}$$

subject to (4.1) and (4.2), where $i = w, m$. The solution of this individual optimization program gives rise to the budget share functions :

$$\omega_i = \frac{p_i x_i}{y_i} = g_i(p_i, y_i), \tag{4.4}$$

where $i = w, m$.

4.2.2 The Couple decision process

We now consider the case of a two-adult household ($h \geq 2$) in which each adult member is endowed with a well-behaved utility function : $U_w(x_w, X_w)$ and $U_m(x_m, X_m)$. For children, individual utility functions are aggregated into a single utility function : $U_c(x_c, X_c) = U_c(X_c)$ with, for the sake of simplicity, a unique argument. We then suppose that the household faces the following budget constraint :

$$z_w p_w + z_m p_m + Z = y. \tag{4.5}$$

The outcome of the decision process is efficient, i.e., the household choice is such that, given the budget constraint and the technology constraint, it is not possible to increase utility of one individual without decreasing the utility of another one.

1. In household surveys, only expenditures are reported, not consumption per se. It could be imagined that a small fraction of purchased goods are not consumed, because of spoilage, waste, or loss. Yet, expenditures for nondurable goods are certainly a good approximation for consumption. For durable goods, which provide a flow of services consumed over a potentially large period of time, the picture is different because expenditures at a given point of time may largely deviate from consumption. Our analysis is thus valid for non-durable goods ; it may be rather hazardous to extend it to durable goods.

In the case of a couple, with or without children, the purchased goods do not necessarily coincide with the consumed goods. Some goods may indeed have a public component. To make a trade-off between flexibility and simplicity, we adopt a quite general consumption technology based on the following two conditions. The first condition is :

$$z_w = x_w, \quad z_m = x_m, \tag{4.6}$$

i.e., the exclusive goods are purely private : for any demographic structure of the household, the consumption of exclusive goods is exactly equal to what is bought by the household. The second condition on the consumption technology is :

$$Z = \sum\nolimits_i A_{h,i}(p_w, p_m) X_i, \tag{4.7}$$

where $A_{h,i}(p_w, p_m)$ are functions independent of y, with $i = w, m$ if $h = 2$ and $i = w, m, c$ if $h = 3$. The purchased goods on the left-hand side are transformed into a (generally) higher level of consumption on the right-hand side, with a transformation rate which may be different for men and women. [2] Incorporating the consumption technology conditions into the budget constraint gives :

$$x_w p_w + x_m p_m + \sum\nolimits_i A_{h,i}(p_w, p_m) X_i = y. \tag{4.8}$$

Then, given ordinality, we can without loss of generality write Pareto efficient decisions as a constrained maximization of the weighted sum of utility functions :

$$\max \sum\nolimits_i \mu_{h,i}(p_w, p_m, y) U_i(x_i, X_i)$$

subject to (4.8), where $\mu_{h,i}(p_m, p_w, y)$ is a (positive) weight that represents the bargaining power of individual i in a household of type h ; it depends on all the exogenous variables of the model, i.e., the prices p_w and p_m, total expenditure y and possibly additional variables not mentioned here. From a bargaining perspective, the Pareto weight

2. The level of publicness of the aggregate good is determined by the level of publicness of the disaggregate goods that compose it. See **APPENDIX B** for an illustration. Other interpretation of price scales will be given in a subsequent section.

$\mu_{h,i}$ can be seen as a measure of individual i's influence in the decision process. The larger the value of $\mu_{h,i}$ is, the greater is the weight that is given to individual i's utility function in the resulting household optimization program.

Decentralization. According to a well-known result in the collective model literature, the decision process can be decentralized. In a first step, spouses agree on a sharing of total expenditure among them. Let $\phi_{h,i}(p_w, p_m, y)$ be the share of total expenditure that individual i living in a household of type h receives. The shares are positive, comprised between zero and one in such a way that they sum up to unity. In a second step, each individual maximizes his or her own utility with his or her own budget constraint :

$$\max U_i(x_i, X_i)$$

subject to

$$x_i p_i + A_{h,i}(p_w, p_m) X_i = y \cdot \phi_{h,i}(p_w, p_m, y) \tag{4.9}$$

with $i = m, w$.[3] Using the property of homogeneity of budget share equations, the solution can be written as :

$$\omega_i = \frac{p_i x_i}{y\phi_{h,i}(p_w, p_m, y)} = g_i\left(\frac{p_i}{A_{h,i}(p_w, p_m)}, \frac{y\phi_{h,i}(p_w, p_m, y)}{A_{h,i}(p_w, p_m)}\right), \tag{4.10}$$

with $i = m, w$ and $\phi_{h,w} + \phi_{h,m} = 1$ if $h = 2$ and $\phi_{h,w} + \phi_{h,m} + \phi_{h,c} = 1$ if $h = 3$.[4] The price of the exclusive goods may, in particular, affect the share of total expenditure devoted to children, as discussed by Bargain and Donni (2012).

Before investigating identification issues, two particular interpretations deserve a brief discussion.

3. For children, the optimization problem is completely degenerated as the children's utility function has only one argument. It may be useful to recall that the two-stage decision process is only a convenient representation. We do not claim that individuals in the household actually decentralize the decision process as described here.

4. To simplify notation in the following pages, we set $A_{h,i} = 1$ and $\phi_{h,i} = 1$ if $h = 1$.

The "Barten" technology : $A_{h,w} = A_{h,m}$. The price scales are the same for men and women. This case has a simple interpretation for a childless couple. To take the example of Browning et al. (2013), let us suppose that a married couple ride together in a car (sharing the consumption of gasoline), half the time the car is in use. Then the total consumption of gasoline (as measured by summing the private equivalent consumption of each household member) is 3/2 times the purchased quantity of gasoline. Equivalently, if there had been no sharing of auto usage, so every member always drove alone, then the household would have had to purchase 50% more gasoline to have each member travel the same distance as before. It is as if the price of gasoline was multiplied by $A_{h,i} = 2/3$. Supposing that $A_{h,w} = A_{h,m}$ is a simplification, though, that does not necessarily hold in general. To show this, let $a_i(p_w, p_m)$ be the proportion of the aggregate good consumed by individual i alone, $a_{i,j}(p_w, p_m)$ the proportion of the aggregate good consumed by individuals i and j together, and $a_{i,j,k}(p_w, p_m)$ is the proportion of the aggregate good consumed by individuals i, j and k together, with $a_w + a_m + a_c + a_{w,m} + a_{w,c} + a_{m,c} + a_{w,m,c} = 1$. In that case, the consumption technology can be written as :

$$Z = A_{h,w}(p_w, p_m)X_w + A_{h,m}(p_w, p_m)X_m + A_{h,c}(p_w, p_m)X_c$$

where $A_{h,w} = a_w + a_{w,m} + a_{w,c} + a_{w,m,c}$, $A_{h,m} = a_m + a_{w,m} + a_{m,c} + a_{w,m,c}$ and $A_{h,c} = a_c + a_{w,c} + a_{m,c} + a_{w,m,c}$. Therefore, the parameters of the consumption technology are generally determined by the household demographic structure. Of course, the price scales are reduced form representations that will generally depend on individual preferences in a rather complicated way.

The "Lindahl" technology : $A_{h,w} + A_{h,m} = 1$. The sum of individual prices coincides with the price of the aggregate good (here equal to one). For a childless couple, this condition is similar to the Bowen-Lindahl-Samuelson condition with the aggregate good being considered as a purely public good. The individual prices can then be interpreted as traditional Lindahl prices which are equal to the marginal rate of substitution

between the public good and the private good. [5] It can be easily shown that

$$A_{h,i} = p_i \left(\frac{\partial U_i}{\partial x_i} \right)^{-1} \frac{\partial U_i}{\partial X}.$$

Note, however, that Lindahl prices will be independent of total expenditure if and only if utility functions are homothetic – an admittedly strong assumption. [6] Even in that case, moreover, the Lindahl prices have to be such that both spouses agree on the same level of the public good. This is not necessarily the case with our framework. Therefore, the Lindahl interpretation is at best a convenient approximation.

4.2.3 Identification and additional concepts

The main issue here is whether individual shares of total expenditure (and thus the cost of children) can be recovered from observed behavior. One general characteristic of survey data is that the variation in total expenditure (or total income) is large but the variation in prices is much more limited. Therefore, it is generally possible to estimate accurately the second order derivative of budget share equations with respect to total expenditure, but not with respect to prices. To take this particularity into account, we follow here the initial idea of Gronau (1991), Couprie (2007), Browning et al. (2013) and others, and combine information on the behavior of singles and couples.

5. From the first order conditions of the optimization problem (with one public good, $X = X_w = X_m$),

$$\begin{aligned} \frac{\mu_w}{\lambda} \cdot \frac{\partial U_w}{\partial X} + \frac{\mu_m}{\lambda} \cdot \frac{\partial U_m}{\partial X} &= 1 \\ \frac{\mu_w}{\lambda} \cdot \frac{\partial U_w}{\partial x_w} &= p_w \\ \frac{\mu_m}{\lambda} \cdot \frac{\partial U_m}{\partial x_m} &= p_m \end{aligned}$$

where λ is the Lagrange multiplier corresponding to the budget constraint, we can easily obtain the Bowen-Lindahl-Samuelson condition.

6. Since there are only two goods, however, this assumption may be more acceptable.

If preferences over goods do not change when individuals marry, then the basic budget share functions ω_w and ω_m could be estimated (and hence identified) using ordinary data on expenditures by men and women living alone. Note, though, that the budget share function ω_c cannot be obtained in this way. In the case of a couple, the budget share equations are of the form :

$$\omega_i = g_i\left(\frac{p_i}{A_{h,i}}, \frac{\phi_{h,i}y}{A_{h,i}}\right), \tag{4.11}$$

with $i = m, w$, where the function $g_i(\cdot)$ is supposed to be known. If we also suppose that

$$\frac{\partial g_i}{\partial(\phi_{h,i}y/A_{h,i})} \neq 0$$

(an assumption that is locally satisfied if exclusive goods are necessary or luxury), then we can write :

$$\phi_{h,i} = \frac{A_{h,i}}{y} G_i\left(\frac{p_i}{A_{h,i}}, \omega_i\right), \tag{4.12}$$

where G_i is the inverse of g_i with respect to its second argument. The individual share of each adult is thus identified up to to a function of prices. For $h = 2$, the functions $A_{h,w}(p_w, p_m)$ and $A_{h,m}(p_w, p_m)$ can generically be identified by the following equation :

$$\frac{A_{h,w}(p_w, p_m)}{y} G_w\left(\frac{p_w}{A_{h,w}(p_w, p_m)}, \omega_w\right)$$

$$+\frac{A_{h,m}(p_w, p_m)}{y} G_m\left(\frac{p_m}{A_{h,m}(p_w, p_m)}, \omega_m\right) = 1$$

Indeed, let us take the price of the exclusive goods as given, i.e., $p_w = \bar{p}_w$ and $p_m = \bar{p}_m$. Then, for each different value of total expenditure, a new equation defining $A_{h,i}(\bar{p}_w, \bar{p}_m)$ is generated. Two equations taken together can be considered as a system, the solution of which is $A_{h,i}(\bar{p}_w, \bar{p}_m)$ with $h = 2$. In **APPENDIX B**, we show that the solution is unique under rather weak conditions. For $h = 3$, the identification of the functions requires additional structure on household behavior. We could suppose, like Lewbel and Pendakur (2008), Bargain and Donni (2012), Dunbar et al. (2013) and Bargain et al. (2014), that individual shares are independent of total expenditure. It

gives the following condition that can be used to identify the functions of prices at stake here :

$$\frac{1}{y}G_i\left(\frac{p_i}{A_{h,i}(p_w,p_m)},\omega_i\right)=\frac{\partial G_i}{\partial \omega_i}\left(\frac{p_i}{A_{h,i}(p_w,p_m)},\omega_i\right)\frac{\partial \omega_i}{\partial y}$$

In what follows, we consider a more general framework and suppose that each parent contributes to children's cost proportionately to the share of total expenditure they would obtain without children, the coefficient of proportionality being independent of total expenditure. It gives the following condition :

$$A_{h,i}(p_w,p_m)G_i\left(\frac{p_i}{A_{h,i}(p_w,p_m)},\omega_i\right)=K_{h,i}(p_w,p_m)\phi_{2,i}(p_w,p_m,y) \tag{4.13}$$

where $K_{h,i}(p_w,p_m)$ is the proportionality coefficient. Now let us suppose again that $p_w=\bar{p}_w$ and $p_m=\bar{p}_m$ and note that $\phi_{2,i}(p_w,p_m,y)$ is known from the preceding reasoning. For each different value of total expenditure, a new equation is generated to give a solution for $A_{h,i}(\bar{p}_w,\bar{p}_m)$ and $K_{h,i}(\bar{p}_w,\bar{p}_m)$. In **APPENDIX B**, we also show that the solution is unique under weak conditions. The children's individual share is then given by

$$\begin{aligned}\phi_{h,c}\;=\;1&-\frac{A_{h,w}(p_w,p_m)}{y}G_w\left(\frac{p_w}{A_{h,w}(p_w,p_m)},\omega_w\right)\\&-\frac{A_{h,m}(p_w,p_m)}{y}G_m\left(\frac{p_m}{A_{h,m}(p_w,p_m)},\omega_m\right).\end{aligned} \tag{4.14}$$

The individual utility function can be recovered up to a transformation from traditional identification results. Indifference scales are then defined as the fraction of household total expenditure that each individual living alone would need to buy a bundle of goods at market prices that put her on the same indifference curve over goods that she attained as a member of the household. Formally, let us define the indirect utility function of individual i living in a household of type h as $V_i(p_i/A_{h,i},\phi_{h,i}y/A_{h,i})$. Then indifference scale $s_{h,i}$ is implicitly defined by

$$V_i(p_i,s_{h,i}y)=V_i\left(\frac{p_i}{A_{h,i}},\frac{\phi_{h,i}y}{A_{h,i}}\right). \tag{4.15}$$

Finally, economies of scale e_h generated by living in a household of type $h \geq 2$ can be defined as the cost needed to consume the household bundle of goods by single individuals facing market prices, in comparison to what the household h actually spends. It is defined by :

$$e_h = \frac{p_w x_w + p_m x_m + \sum_i X_i}{p_w x_w + p_m x_m + \sum_i A_{h,i}(p_w, p_m) X_i}, \tag{4.16}$$

for some x_w, x_m, X_w and X_m.

4.3 Empirical implementation

4.3.1 Functional forms

We turn to the empirical specification of the complete model, suggesting a parameterizations that balances flexibility and empirical tractability. Following the recognition that a quadratic specification is generally necessary to model budget shares (Banks et al., 1997), we adopt the following QUAIDS-type form for the "basic" budget share equation :[7]

$$\omega_i(p_i, y) = \alpha_i' \mathbf{m} + \beta_i \log p_i + \gamma_i \log y + \delta_i (\log y)^2 \tag{4.17}$$

with $i = w, m$, where α_i, β_i ,γ_i and δ_i are (vector of) parameters, and $\mathbf{m}$ is a vector of other variables (such as education, age and a dummy for work). The parameters are gender-specific (with $i = w$ for women, $i = m$ for men) but do not depend on the demographic type h, since the "basic" budget share equations are the same for single women and for women living in a couple. To account for unobserved factors, we add

7. This is not exactly the traditional QUAIDS formulation of Banks et al.(1997) because total expenditure is not deflated by a price index. Nonetheless, the Slutsky symmetry are automatically satisfied because there are only two goods and homogeneity condition is imposed. The budget share equation is thus consistent with the consumer theory.

error terms to the household budget shares previously defined :

$$\tilde{\omega}_i = \omega_i + \varepsilon_i \tag{4.18}$$

where $\tilde{\omega}_i$ is the stochastic extension of ω_i. Error terms ε_i are traditionally interpreted as optimization/measurement errors or, alternatively, as resulting from unobservable heterogeneity in the individual budget share equations.

For multi-person households ($h \geq 2$), the household budget share equations are constructed from the basic equation (4.17) and other components that are defined below :

$$\tilde{\omega}_i = \phi_{h,i} \cdot \tilde{\omega}_i \left(\frac{p_i}{A_{h,i}}, \frac{y}{A_{h,i}} \phi_{h,i} \right) \tag{4.19}$$

To simplify, we shall suppose that individual shares of total expenditure and price scales are independent of prices. First, the following linearized specification is adopted for the log of individual shares of total expenditure :

$$\log \phi_{h,w} = \log \left(\frac{1}{2} \right) + \frac{a + b \log y + cs}{2} + d_w n$$

and

$$\log \phi_{h,m} = \log \left(\frac{1}{2} \right) - \frac{a + b \log y + cs}{2} + d_m n.$$

where n is the number of children and s is the ratio of male and female income, and a, b, c, d_w and d_m are parameters. This specification satisfies the condition necessary for identification. For a childless couple, they do not sum to one but they can be seen as a linear approximation (see Browning et al., 1994, and **APPENDIX B**) of the following logistic form :

$$\phi_{h,w} = \frac{\exp\left(a + b \log y + cs\right)}{1 + \exp\left(a + b \log y + cs\right)} \times \exp(d_w n) \tag{4.20}$$

and

$$\phi_{h,m} = \frac{1}{1 + \exp\left(a + b \log y + cs\right)} \times \exp(d_m n) \tag{4.21}$$

This logistic form bounds individual shares between zero and one. Second, the individual prices $A_{h,i}$ which reflect the economies of scale associated to each individual can in

principle vary with prices and all the variables entering preferences. In our specification, however, it is restricted to be equal to a constant. Two particular cases are considered :

$$\begin{cases} A_{h,w} = A_{h,m} & \text{for the Barten technology} \\ A_{h,w} + A_{h,m} = 1 & \text{for the Lindahl technology} \end{cases}$$

It follows that, for goods that are mostly shared, conjoint's constants are identical, while for a purely public good with no jointness of consumption, conjoint's constants are different but need equal one.

4.3.2 Data and sample selection

Because of its availability and its quality, the UK Family Expenditure Survey (FES) has been used in a large number of empirical studies (Browning et al. 1985 ; Atkinson and Cazes, 1990 ; Dauphin et al., 2008, among many others). This is a cross sectional survey which collects information on household expenditures on durable and nondurable goods, on the income and labor supply of members of the household, and on their socio-economic characteristics.

In our empirical analysis, we use the surveys covering the period 1988-2007. The initial sample consists of 138,566 households. We restrict it to monogamous, nuclear households (i.e., either a single adult or a married couple with at most three children). This selection drops 37.2% of the sample. We further restrict it to households where adults are aged between 25-60 years, which excludes another 29.2% of the sample. To ensure that we can distinguish children's clothing from adults clothing, we finally drop households with children whose age is above 15 years. This ultimate selection (representing 7.6% of the initial sample) leaves us with 35,997 households (26% of the initial sample), described in Table 4.1.

Since expenditure on durable goods is an unsatisfactory measure of their consumption, we suppose that nondurable goods are separable from durable goods in individual preferences and focus on the former. Expenditure on exclusive goods is thus supposed to depend solely on the household's total expenditures net of expenditures on durable goods (Dauphin et al., 2008). The demand system we estimate comprises two exclusive goods (male and female clothing) ; it is just what we need to identify the structural elements of the model. Clothing expenditures are recorded via a questionnaire with a recall period of the last 3 months. This helps to avoid too many zeros due to infrequency of purchase. A marginal proportion of single women reports nonzero expenditures on male clothing ; the same occurs with expenditures on female clothing by single men or expenditures on children by childless households. These expenditures are interpreted as gifts and, in order to treat clothing as an assignable good, are ignored. Prices of all goods are measured monthly at the country level. [8]

4.4 Empirical results

4.4.1 A First look at the data

Table 4.1 provide descriptive statistics of our sample by household type. We observe that our sample consists of 10,708 (30%) single households, most of them are males [9], and 25,289 (70%) couple households of those ; 44% are childless couples, 19% are couples with one child, 28% are couples with two children and 9% are couples with three children. Otherwise, the descriptive statistics in Table 4.1 provide a first overview of the problems we have to address. For one time, let us adopt the traditional Rothbarth way of thinking. If we consider clothing goods, we note that the presence of children

8. Because of the limitation of the data, we do not make a distinction between male's and female's clothing price, i.e., $p_m = p_w$

9. It is perhaps because women get married younger.

Family Type	**Single Men**	**Single Women**	**Childless Couples**	**Couples with Children**
Household characteristics				
Men'age	42.24	.....	45.7	38.01
Women's age	.....	44.94	43.97	35.61
Men's education	12.46	.....	12.26	12.53
Women's education	.....	12.44	12.32	12.61
Number of children	.....	.....	.....	1.82
Income ratio	.....	.....	2.117	2.778
Expenditure on clothing goods				
Men's clothing	0.055	.....	0.063	0.052
Women's clothing	.....	0.099	0.117	0.084
Children's clothing	.....	.....	.....	0.094
Total expenditure	1.488	1.367	2.91	3.13
Budget shares of clothing goods				
Men's clothing	0.039	.....	0.027	0.021
Women's clothing	.....	0.08	0.048	0.033
Children's clothing	.....	.....	.....	0.041
Sample Size	5821	4887	11128	14161
Note : All expenditures are deflated by the equivalent price index.				

TABLE 4.1 – Summary statistics of the sample, by family type

reduces the share of total expenditure devoted to parents. For instance, while the average weekly quantities of women's and men's clothing consumed by childless couples are 0.117 and 0.063 respectively, they drop to 0.084 and 0.052 respectively in couples with children. The Rothbarth intuition then suggests that, on average, the parents' welfare from consumption (at least) declines when the size of the household increases ; the arrival of a child is similar to an income effect which decreases the welfare parents get out of consumption as they re-allocate their limited resources to accommodate children's needs. Yet, the story is not complete. We also observe that the presence of the children within household affects more the budget share of women than those of men. One interpretation is that children represent a cost for the parents but it seems that this cost is essentially supported by women.

4.4.2 Estimation results

First of all, the possible endogeneity of some independent variables deserves further attention. One source of endogeneity is a potential correlation between the number of children in the household and the residuals in the clothing equations. In particular, if unobserved heterogeneity in individual shares of total expenditure (or perhaps less crucially in individual preferences for clothing) is connected to fertility decisions, then the number of children in the household will be endogenous. Nevertheless, there is a theoretical evidence that resource allocations may be decided long after fertility decisions (Dunbar, et al., 2013). Hence the endogenous fertility issue must likely not be overstated. Another possible source of endogeneity in our setting is that total expenditures can suffer from measurement error, either because of infrequency of purchases creating a wedge between total expenditures and actual consumption, or because of recall errors, since total consumption is measured by asking households to recall their past expenditures. To account for the likely correlation between the error terms in each budget share function and the log total expenditure, we estimate the system by the iterated three-stage least squares method. For instruments we take all of the demographics plus

log gross income and its squares.

We start with an extremely parsimonious specification and add extra parameters until we find a satisfactory fit. In all the budget share equations, we incorporate individual's age and education in years and a dummy for labor force participation as control variables. In **Model I**, the price scales are set equal to one, and the individual shares are constant, i.e., independent of heterogeneity factors. The specification is then comparable to a traditional Rothbarth model. The results are exposed in Table 4.2. The specification has 17 parameters (out of which 11 are significantly different form zero at the 10% level). We first note that the budget shares are negatively related to age but not affected by education or wife's participation in the labor force. The price of exclusive goods has a positive effect on budget shares (but a negative effect on purchased quantities, as expected). However, the J-statistics amounts to 28.66 for 11 degrees of freedom. The specification is clearly rejected at any usual significance level. In addition, if we conduct a Wald test, we also reject the restriction of constant shares and no scale economies. The results of the tests are reported in Table 4.3. In the more general **Model II**, some individual characteristics are incorporated into the sharing functions, i.e., $\phi_{h,i}$ depends on total expenditure, on the male and female income ratio and on the number of children living within the household. The coefficients of the budget share equations are basically the same as in the previous specification. Importantly, the women's share of total expenditure significantly increases with the level total expenditure. This seems to indicate that the hypothesis usually made (see the references given in the introduction) that the proportion of total expenditure received by household members is constant does not hold. In addition, the women's share is also negatively, although not very significantly, related to the part of male income in household total income. Finally, the presence of children has a contracting effect on the shares of total expenditure devoted to adults. The effect is more pronounced on women's share than on men's share (yet the difference is not significant). Overidentification restrictions are not strongly rejected with a statistics equal to 17.36 with 9 degrees of freedom. However, the restriction of no scale economies is rejected using a Wald test. Hence, we now incorporate economies

Models	Model I	Model II	Model III	Model IV	Model V
Estimates of women's budget share					
Constant	0.110	0.117	0.120	0.125	0.124
	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)
Education	-0.0002	-0.0001	-0.0002	-0.0003	-0.0003
	(0.0003)	(0.0003)	(0.0003)	(0.0004)	(0.0004)
Age	-0.0008	-0.0008	-0.0009	-0.001	-0.001
	(0.00008)	(0.00008)	(0.00009)	(0.0001)	(0.0001)
Clothing Price	0.023	0.023	0.026	0.031	0.030
	(0.002)	(0.002)	(0.003)	(0.005)	(0.005)
Dummy for work	0.0001	-0.001	-0.001	0.0008	0.0009
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Log(total expenditure)	0.043	0.031	0.031	0.032	0.033
	(0.004)	(0.007)	(0.007)	(0.006)	(0.006)
Log(total expenditure)2	-0.010	-0.021	-0.020	-0.016	-0.017
	(0.008)	(0.007)	(0.004)	(0.003)	(0.003)
Estimates of men's budget share					
Constant	0.105	0.107	0.044	0.009	0.031
	(0.010)	(0.013)	(0.067)	(0.041)	(0.093)
Education	-0.0002	-0.0001	-0.0004	-0.0004	-0.0002
	(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.0004)
Age	-0.001	-0.001	-0.001	-0.0006	-0.0007
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)
Clothing Price	0.025	0.023	0.018	0.012	0.014
	(0.003)	(0.003)	(0.004)	(0.003)	(0.005)
Dummy for work	0.0003	-0.001	-0.001	-0.0009	-0.001
	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Log(total expenditure)	0.020	0.051	0.103	-0.037	0.117
	(0.003)	(0.027)	(0.073)	(0.191)	(0.109)
Log(total expenditure)2	-0.016	-0.038	-0.024	0.141	-0.023
	(0.009)	(0.020)	(0.039)	(0.187)	(0.060)
Estimates of women's share					
Constant	0.101	-0.144	-0.442	-1.031	-0.811
	(0.018)	(0.142)	(0.296)	(0.336)	(0.549)
Log(total expenditure)	0.000	0.317	0.495	0.786	0.645
		(0.184)	(0.319)	(0.143)	(0.380)
Income ratio	0.000	-6.694	-5.555	-2.195	-4.384
		(4.319)	(4.789)	(2.098)	(5.444)
Children	-0.181	-0.219	-0.247	-0.289	-0.267
	(0.009)	(0.030)	(0.053)	(0.026)	(0.061)
Estimates of men's share					
Constant	0.101	-0.144	-0.442	-1.031	-0.811
	(0.018)	(0.142)	(0.296)	(0.336)	(0.549)
Log(total expenditure)	0.000	0.317	0.495	0.786	0.645
		(0.184)	(0.319)	(0.143)	(0.380)
Income ratio	0.000	-6.694	-5.555	-2.195	-4.384
		(4.319)	(4.789)	(2.098)	(5.444)
Children	0.167	0.119	0.095	0.042	0.066
	(0.013)	(0.035)	(0.057)	(0.030)	(0.071)
Estimates of women's Shadow Prices	1.000	1.000	0.682	0.239	0.356
			(0.179)	(0.195)	(0.322)
Estimates of men's Shadow Prices	1.000	1.000	0.682	0.760	1.000
			(0.179)	(0.195)	
Number of parameters	17	19	21	21	21
Average Observations per equation	25309	25309	25309	25309	25309
J-Statistics	28.658	17.365	15.474	15.137	14.052
Degree of overidentification	11	9	8	8	8

TABLE 4.2 – Estimates of clothing's budget shares

Models	Model I	Model II	Model III	Model IV	Model V
Wald-statistics for the restriction "same children's cost for each parent"	0.84	2.48	1.93	21.57	2.37
Wald-statistic for the restriction "constant shares and no scale economies"	34.07	.....	.....	.....	.....
Wald-statistic for the restriction "no scale economies"	.....	4.41	.....	.....	.....
Wald-statistic for the restriction "Barten technology"	.....	.....	1.12	.....	.....
Wald-statistic for the restriction "Lindahl technology"	.....	.....	.....	0.43	.....

TABLE 4.3 – Wald test for Models

of scale. In **Model III**, we consider a Barten technology ($A_{h,w} = A_{h,m}$) while in **Model IV**, we adopt a Lindahl technology ($A_{h,w} + A_{h,m} = 1$). The Wald test does not reject any of these simplifying restrictions and the J-test does not reject overidentification restrictions, with J-statistics being equal to 15.47 and 15.14, with 8 degrees of freedom. [10] Nevertheless, we also consider **Model V** where all the parameters are free. [11] The specification has 21 free parameters (out of which 9 are significantly different form zero at the 10% level). For this general model, the estimated coefficients are very close to those of the more constrained models. In particular, the coefficients of log expenditure and its square show a quadratic pattern (as in most specifications), suggesting that, at the average point of the sample, clothing is a luxury good (see also Banks et al., 1997, Bargain and Donni, 2012 for a similar result). The coefficients are also very different between genders : those for women are about twice those of men. This condition, which indicates that men and women have not the same preferences with respect to clothing, is necessary to apply our identification result. One of the main differences here by comparison with **Model I**, however, is that the fraction of the children's cost supported by women is more patently larger than that supported by men. [12]

10. Precisely, overidentification restrictions are not rejected at the 5% level but are rejected at the 10% level. Nevertheless, this conclusion is actually satisfactory in view of the very large size of our sample.

11. Price scales are constrained to be lower than one, though.

12. Yet we do not formally reject the hypothesis that men and women support the same fraction of children's cost. The corresponding Wald statistics for **Model V** is indeed equal to 2.37. The hypothesis

In what follows, we will consider **Model V**, because of its generality, as the benchmark model.

4.4.2.1 Shares of total expenditure for adults and children

The estimated shares of total expenditure, as well as their standard errors, evaluated at the average point of the sample for each type of household are reported in Table 4.4. For the different specifications, the wife's (husband's) share of total expenditure for childless couples oscillates between 0.41 and 0.53 (0.47 and 0.59). Total expenditure is thus almost equally divided. [13] The wife's share seems to be smaller for models in which the price scales are individual-specific (**Model IV** and **Model V**) but the difference can be explained by large standard errors. If we consider a couple with children, by comparison, a fraction of resources is naturally diverted from parents to children. The total resources for parents roughly decline with the number of children but this is not spread evenly across men and women. For all the specifications, we can see that the wife's share is much more reduced by the presence of children than the husband's share. For a couple with one (two, three) child(ren), the former drops by about 9 to 11 (7 to 8, 6 to 7) points depending on the specification while the latter drops by only 3 to 7 (4 to 6, 2 to 5) points. [14] One of the most robust results is that the wife's share of total expenditure tends to increase with total expenditure. This is illustrated in Figure4.1

is rejected only for **Model IV**.

13. To make a comparison, Lewbel and Pendakur (2008) report a female share between 0.36 and 0.46 (in a developing country), while Browning et al. (2013) and Bargain and Donni (2012) report a female share in excess of 0.60.

14. These findings are in the spirit of Dunbar et al. (2013), who use a similar estimation technique with Malawian data and find evidence that the monetary cost of children is essentially borne by women, and not by men. For example, they find that men absorb between 0.38 and 0.44 of household resources in households with one child (depending on the specification) while, in contrast, women have a share of resources that turns between 0.31 and 0.37. One important difference with our results is that the estimates of Dunbar et al. were given for one of the poorest countries in the world, while our conclusions apply to a rich country.

Models	Model I	Model II	Model III	Model IV	Model V
Couples with no child					
Women	0.525	0.529	0.494	0.412	0.435
	(0.004)	(0.008)	(0.022)	(0.063)	(0.061)
Men	0.474	0.470	0.505	0.587	0.564
	(0.004)	(0.008)	(0.022)	(0.063)	(0.061)
Couples with one child					
Women	0.438	0.427	0.389	0.314	0.337
	(0.004)	(0.007)	(0.024)	(0.049)	(0.060)
Men	0.401	0.415	0.455	0.555	0.522
	(0.006)	(0.009)	(0.028)	(0.068)	(0.084)
Children	0.160	0.157	0.154	0.129	0.139
	(0.006)	(0.006)	(0.008)	(0.021)	(0.025)
Couples with two children					
Women	0.365	0.346	0.310	0.244	0.266
	(0.006)	(0.013)	(0.028)	(0.038)	(0.055)
Men	0.339	0.363	0.406	0.518	0.477
	(0.009)	(0.017)	(0.039)	(0.074)	(0.101)
Children	0.294	0.289	0.283	0.237	0.256
	(0.011)	(0.011)	(0.015)	(0.038)	(0.047)
Couples with three children					
Women	0.304	0.277	0.241	0.181	0.201
	(0.008)	(0.019)	(0.035)	(0.031)	(0.054)
Men	0.287	0.324	0.371	0.500	0.450
	(0.011)	(0.027)	(0.057)	(0.083)	(0.127)
Children	0.407	0.398	0.387	0.317	0.348
	(0.014)	(0.015)	(0.026)	(0.054)	(0.074)
Note : Shares are calculated at the level of the average point for each demographic group.					

TABLE 4.4 – Expenditure shares

for **Model V**. The wife's share is represented with respect to total expenditure between the 5th percentile and the 95th percentile. For a couple without children, it varies between 0.56 and 0.22. This is a large dispersion, which implies that assuming a base-independent share of total expenditure may seriously distort the results. For a couple with one (two, three) child(ren), the wife's share varies between 0.43 (0.33, 0.25) and 0.17 (0.13, 0.10). Finally, it is worth examining the cost of children. For all the specifications, a couple with one child dedicates between 13 and 16 percent of its total expenditure to children's consumption.[15] For a couple with two children, the share rises to about 24 or 29 percent, and with three children, to about 32 to 40 percent. Estimates are thus generally stable and does not seem to depend on the specification.

4.4.2.2 Shadow prices and economies of scales

The estimates of price scales are exposed in the lower panel of Table 4.2. In the third column of this table, we assume that the consumption technology is a Barten one (**Model III**). Following this approach, individuals are thus facing the same shadow prices. According to our results, the Barten scale for a couple amount to about 0.68 with a standard deviation of 0.18, which represent a reasonable order of magnitude. These point estimates thus imply that the shadow price of the aggregate good faced within a couple household represent 68% of market prices faced by a single woman or man. To measure economies of scale we have to use (4.16). Following our estimates, on average, economies of scales amount to 1.43 for a childless couple[16] with a standard deviation of 0.35. By comparison, Browning, et al. (2013) obtain economies of scale between 1.27 and 1.41 while Bargain and Donni (2012) report economies of scale equal to 1.73. In the fourth column of Table 4.2, the sum of the individual prices of the aggregate good

15. This is in line with results obtained in the literature with the traditional Rothbarth method. For instance, with United States data, Gronau (1991) estimates the cost of one child at about 15 percent of total expenditure, with Spanish data, Deaton, Ruiz-Castillo and Thomas (1989) at between 11 percent and 18 percent and, with Greek data, Tsakloglou (1991) at between 9 percent and 13 percent.

16. For couples with children, economies of scales are of the same order.

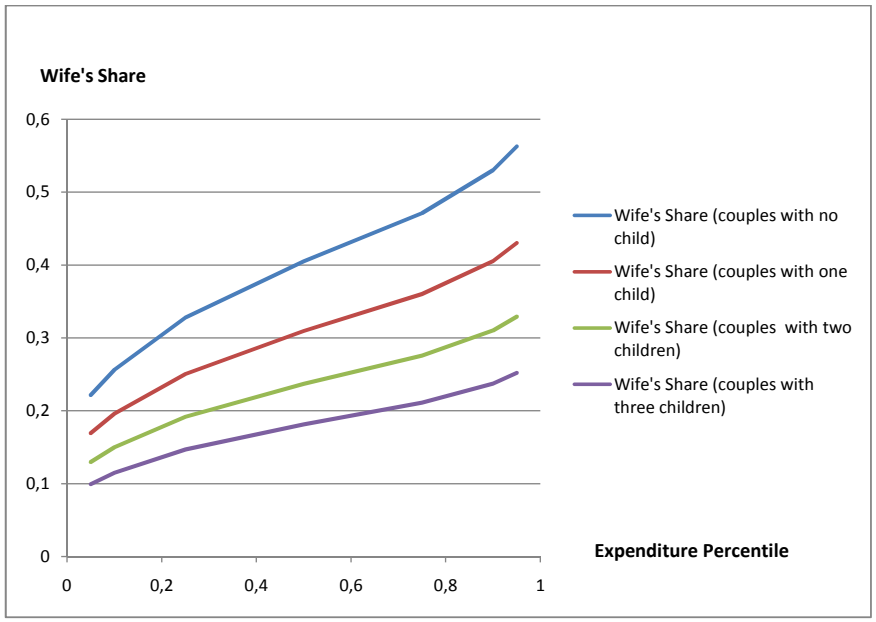

FIGURE 4.1 – Wife's share and total expenditure

is supposed to be equal to one (**Model IV**). On the basis of these estimates, price scales amount to about 0.76 and 0.24 for men and for women, respectively. The price scale for women is excessively small but standard errors remain quite large. In the most general specification, the price scales are unconstrained (**Model V**). The values are of the same order as those obtained for the preceding model. The corresponding economies of scale are equal to about 1.36 for a childless couple, with a standard error of 0.18, and are sensibly lower for a couple with children.

4.4.2.3 Robustness check : additional models

To check the robustness of our results, we consider five additional models in Table 4.5. **Models VI**, **VII** and **VIII** are similar to **Models III**, **IV** and **V** with a third order term in scaled log expenditure. The estimates are closely comparable to those of the simple model. The restriction according to which there is no third order term is not rejected at usual levels of significance by a Wald test. Because expenditure on clothing may be endogenous to working decisions – this point has previously been raised by Browning et al. (1994) – and controlling by a simple dummy variable may not be sufficient, we then consider **Model IX** with a general technology where coefficients are estimated on a sample with only full-time working individuals. The coefficients change a little with this alternative sample but the results are consistent with the previous models. In particular, the price scales are of same order of magnitude as those obtained with **Model V**. The effect of total expenditure on individual shares is no longer significant but standard errors are large. Finally, we also consider **Model X** where the price scales are supposed to depend on the number of children. This does not change the main conclusions either. The children's effect is now more important for men's share than women's share but standard errors are large.

Models	Model VI	Model VII	Model VIII	Model IX	Model X
Estimates of women's budget share					
Constant	0.127	0.128	0.126	0.051	0.123
	(0.010)	(0.009)	(0.009)	(0.050)	(0.008)
Education	-0.0002	-0.0003	-0.0002	0.00005	-0.0003
	(0.0004)	(0.0004)	(0.0004)	(0.0009)	(0.0004)
Age	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.0001)	(0.0001)	(0.0001)	(0.0005)	(0.0001)
Clothing Price	0.027	0.028	0.028	0.043	0.029
	(0.004)	(0.005)	(0.005)	(0.021)	(0.004)
Dummy for work	-0.0001	0.001	0.0004	.....	-0.002
	(0.003)	(0.003)	(0.003)		(0.003)
Log(total expenditure)	0.028	0.032	0.030	0.130	0.032
	(0.008)	(0.007)	(0.007)	(0.088)	(0.006)
Log(total expenditure)2	-0.032	-0.031	-0.029	-0.049	-0.018
	(0.018)	(0.016)	(0.015)	(0.032)	(0.003)
Log(total expenditure)3	0.006	0.005	0.004	.....	.....
	(0.008)	(0.005)	(0.005)		
Estimates of men's budget share					
Constant	0.221	0.236	0.110	0.058	0.017
	(0.169)	(0.191)	(0.244)	(0.083)	(0.059)
Education	-0.0005	-0.0004	-0.0005	-0.0004	-0.0004
	(0.0005)	(0.0004)	(0.0005)	(0.0005)	(0.0004)
Age	-0.0008	-0.0007	-0.0008	-0.0008	-0.001
	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0002)
Clothing Price	0.016	0.014	0.012	0.016	0.016
	(0.004)	(0.004)	(0.003)	(0.010)	(0.004)
Dummy for work	-0.0004	-0.00001	0.0004	.....	-0.003
	(0.001)	(0.002)	(0.002)		(0.002)
Log(total expenditure)	-0.744	-1.243	-0.908	0.038	0.284
	(0.469)	(1.097)	(1.789)	(0.072)	(0.210)
Log(total expenditure)2	0.830	2.158	2.900	0.002	-0.159
	(0.624)	(1.860)	(2.845)	(0.057)	(0.149)
Log(total expenditure)3	-0.254	-1.024	-1.848	.....	.....
	(0.291)	(0.938)	(1.397)		
Estimates of women's share					
Constant	-0.726	-0.949	-0.983	-0.631	-0.827
	(0.171)	(0.262)	(0.239)	(1.090)	(0.201)
Log(total expenditure)	0.675	0.814	0.887	0.367	0.725
	(0.109)	(0.110)	(0.048)	(0.681)	(0.157)
Income ratio	-5.568	-3.373	-2.212	-13.959	-11.824
	(2.926)	(2.665)	(1.097)	(13.584)	(4.727)
Children	-0.270	-0.293	-0.305	-0.207	-0.277
	(0.024)	(0.026)	(0.018)	(0.105)	(0.032)
Estimates of men's share					
Constant	-0.726	-0.949	-0.983	-0.631	-0.827
	(0.171)	(0.262)	(0.239)	(1.090)	(0.201)
Log(total expenditure)	0.675	0.814	0.887	0.367	0.725
	(0.109)	(0.110)	(0.048)	(0.681)	(0.157)
Income ratio	-5.568	-3.373	-2.212	-13.959	-11.824
	(2.926)	(2.665)	(1.097)	(13.584)	(4.727)
Children	0.062	0.036	0.023	0.134	0.404
	(0.023)	(0.022)	(0.010)	(0.139)	(0.198)
Estimates of women's Shadow Prices					
Constant	0.427	0.260	0.276	0.341	0.359
	(0.173)	(0.187)	(0.176)	(0.320)	(0.160)
Children	.....	.....	.....	.....	9.03E-35
					(0.000)

TABLE 4.5 – Estimates of clothing's budget shares for additional models

Estimates of men's Shadow Prices					
Constant	0.427	0.739	1	1	1
	(0.173)	(0.187)	(0.000)	(0.000)	(0.000)
Children	.....	.....	.....	.....	-0.271
					(0.123)
Number of parameters	23	23	23	19	23
Average Observations per equation	25309	25309	25309	7243	25309
J-Statistics	12.126	10.001	7.181	10.503	11.764
Degree of overidentification	6	6	6	8	7
Wald-statistics for the restriction "same children's cost for each paren"	21.72	31.82	132.02	0.09	0.36
Wald-statistics for the restriction "no third order term"	1.27	2.04	3.27	.....	.....

TABLE 4.5 Suite

4.5 Conclusion

Despite the apparent importance of understanding the intra-household dimension of child cost, very few collective household models have focused on children's cost identification. Most collective models either ignore children, or treat them as public or private goods for adults. In this paper, we propose a collective model which is consistent with the existence of economies of scale, from joint and pure public consumption, and parental bargaining in a structural, multi-person model. It is more general than Bargain and Donni (2012) or Dunbar et al. (2013)'s approaches in the sense that individual shares are not supposed to be independent of total expenditure. In addition, it is compatible with a very general form of economies of scale. The shadow price of the aggregate consumption may depend on prices – even if we do not consider this opportunity in our estimations– and it has not to be the same for both spouses. Then, using a very large sample extracted from the U.K. Family Expenditure Survey data, we find that children command a reasonably large share of total expenditure. The cost of children, i.e., the share of total expenditure devoted to children, rises with the number of children, and appear to be mainly supported by mothers, and not by fathers. We also find that price scales are reasonable in magnitude for both spouses, but excessively small for women for some specifications. Finally, it is worth saying that the main conclusions of our research do not depend on the specification.

Chapitre 5

Conclusion générale

Le champ de l'économie de la famille est en effet en plein essor mais de nombreux secteurs de recherche demeurent inexplorés. Plusieurs éléments expliquent cela. D'une part, la famille est en mouvement. La structure familiale a profondément évolué. Le taux de divorce a crû sensiblement. En conséquence, les familles recomposées tout comme les familles monoparentales ont connu une croissance rapide. La cohabitation est devenue un mode de vie en couple de plus en plus fréquent. D'où la naissance d'un grand nombre d'enfants dans un cadre hors mariage. Ces nombreux changements affectent les choix matrimoniaux des individus et plus généralement leurs décisions économiques. D'autre part, le développement des modèles de ménages non-unitaires a donné aux économistes de nouveaux outils pour mieux analyser le fonctionnement des ménages. La combinaison de ces phénomènes a engendré un besoin de compréhension nouveau et a ouvert de nombreuses pistes de recherche aussi bien théoriques qu'empiriques pour les sciences économiques.

Cette thèse se situe ainsi comme une contribution à l'économie de la famille qui se propose d'apporter des éléments pouvant améliorer notre compréhension du lien entre

statut marital et consommation. Le Chapitre II s'intéresse à modéliser théoriquement la relation "aversion au risque et statut marital". Dans cette contribution théorique, le ménage est décrit par un modèle en deux étapes. Les partenaires se mettent en couple au début de la première étape, ils peuvent choisir entre le mariage et le concubinage, et partagent ainsi leurs ressources en fonction de leurs points de menace. Les résultats montrent que les conjoints averses au risque, confrontés seulement à un risque de négociation, doivent choisir le mariage, associé à un coût de séparation élevé, afin de diminuer les fluctuations de consommation intra ménage. Ce résultat est ensuite généralisé avec l'introduction du risque de séparation/divorce. Ainsi, nous montrons que le mariage demeure le choix optimal pour les conjoints averses au risque qui cherchent à minimiser la probabilité de rupture au sein du couple. Certes que la modélisation théorique de la relation "aversion au risque et statut marital" a pu déterminer quelques traits marquants de l'effect du status marital (marié vs concubin) sur les décisions intra ménage dans un contexte uncertain, néanmoins, l'aspect empirique dans ce chapitre est insuffisament pris en compte. La modélisation empirique de l'impact des choix maritaux sur les décisions intra ménage est essentielle dans l'objectif de donner plus de crédibilité à nos résultats. Dans le Chapitre III, nous partons de l'observation empirique que l'effet du statut marital sur les dépenses vêtements pour enfants au sein des ménages Britanniques a changé entre 1995 et 2007. Les résultats empiriques de cette étude exploratoire montrent que le statut marital (mariage vs concubinage) n'est plus un facteur significatif du bien être des enfants depuis 2002. Cela explique aisément l'effet de la réforme financière mis en vigueur en UK en juillet 2002 qui vient essentiellement à protéger les droits financières des concubins et à réduire ainsi la différence de bien-être des enfants entre les couples mariés et les couples concubins. L'intérêt d'une modélisation simple se justifie essentiellement par le fait qu'elle peut permettre d'analyser l'évolution inter temporelle du status marital. Si, dans cet objectif, nous avons pu déterminer l'évolution d'effet du statut marital sur le bien-être des enfants avant et après 2002, il apparaît que la prise en compte des développement récents des modèles collectifs (rêgle de partage et économies d'échelle) est insuffisament respectée. Dans le Chapitre IV, nous illustrons la relation "statut marital-consommation" par une application empirique plus strutu-

relle en utilisant toujours des données Britanniques mais pour une plus longue période (1988-2007). Dans toutes les estimations présentées dans ce chapitre, les décisions intra ménage sont issues d'une modélisation collective des choix intra-familiaux. Ce choix peut se justifier de plusieurs façons. D'une part, le modèle collectif prend en compte une grande richesse de comportements ; il permet notamment de décrire les modes de répartition du bien-être à l'intérieur de la famille et d'en chercher les déterminants. Un intérêt particulier du modèle provient du fait que la règle de partage du revenu à l'intérieur de la famille dépende du nombre d'enfants, ce qui permet d'estimer le coût individuel des enfants. Sur la base de ces estimations, le coût des enfants est supporté plus par la femme que par l'homme. En l'état actuel des "pratiques" permettant d'estimer le coût des enfants à l'intérieur du ménage, le statut marital des individus (célibataires ou en couples) est supposé exogène. Ce type de modélisation pose problème dans la mesure où les différences de comportement observées entre les célibataires et les personnes mariées peuvent ne pas être dues au statut marital lui-même mais à une variable non observée qui expliquerait ce statut. Une manière de résoudre ce problème serait d'utiliser des données de panel (sous la condition que la variable non observée reste constante au cours du temps pour un même ménage). Puisque de telles données ne sont pas disponibles, l'approche Deaton (1985) peut être le chemin à suivre dans ce cas.

Bibliographie

Adam, C., J. Hoddinott, and E. Ligon (2004) : "Dynamic Intra-household Bargaining, Matrimonial Property Law, and Suicide in Canada". In : *Quisumbing, Agnes (ed.), Household Decisions, Gender, and Development*, Washington, DC : IFPRI.

Anderson, L.R. and J. M. Mellor (2008) : "Predicting health behaviors with an experimental measure of risk preference". *Journal of Health Economics*. 27(5), 1260-1274.

Anxo D., L. Flood, and Y. Kocoglu (2002) : "Offre de travail et répartition des activités domestiques et parentales au sein du couple : une comparaison entre la France et la Suède". *Economie et Statistiques*, 352-353, pp. 127-150.

Arrondel, L. and H. Calvo Pardo (2009) : "Les Français sont-ils prudents ? Patrimoine et risque sur le marché du travail". *Economics Papers* from University Paris Dauphine 123456789/5057, Paris Dauphine University.

Ashworth, J. and D. Ulph (1981) : "Estimating labour supply with piece-wise linear budget constraints". Dans C.V. *Brown (réd.), Taxation and Labour Supply, Allen and Unwin*, London.

Atkinson, A.B. and S. Cazes (1990) : "Mesures de la pauvreté et politiques sociales : une étude comparative de la France, de la RFA et du Royaume-Uni". *Revue de l'OFCE,*

Programme National Persée, vol. 33(1), pages 105-130.

Banks, J., R.W. Blundell, and A. Lewbel (1997) : "Quadratic Engel Curves and Consumer Demand". *Review of Economics and Statistics*, vol. 79, No. 4, pp. 527.539.

Bargain, O. and O. Donni (2012) : "The Measurement of Child Costs : A Rothbarth-Type Method Consistent with Scale Economies and Parents' Bargaining". *European Economic Review*, 56 (4), 792-813.

Barsky, R. B., M. S. Kimball, F.T. Juster, and M. D. Shapiro (1997) : "Preference Parameters and Behavioral Heterogeneity : An Experimental Approach in the Health and Retirement Study". *Quarterly Journal of Economics* 112 : 537-579.

Barten, A.P. (1964) :"Family Composition, Prices and Expenditure Patterns". *Econometric Analysis for National Economic Planning*, Londres, Butterworth.

Bauman, K. (1999) : "Shifting family definitions : The effect of cohabitation and other non family household relationships on measures of poverty". *Demography*, 36, 315-326.

Becker, G. (1974) : "A theory of social interactions". *Journal of Political Economy*, 82(6), 1063-1094.

Becker, G. S. (1978) : "*The Economic Approach to Human Behavior*". University of Chicago Press Economics Books, University of Chicago Press, edition 0, number 9780226041124.

Becker, G. S. (1981) : "*A Treatise on the Family*". NBER Books, National Bureau of Economic Research, Inc, number beck81-1.

Becker, G.S. (1991) : "*A Treatise on the Family*". Enl. Edition, Cambridge University

Press.

Becker, G., E. Landes, and R. Michael (1977) : "An Economic Analysis of Marital Instability". *Journal of Political Economy*, vol. 85, pp. 1141-1188.

Bergstrm, T.C. (1989) : "A fresh look at the rotten kid theorem and other household mysteries". *Journal of Political Economy*, 97(5),1138-1159.

Bergstrom, T., L. Blume, and H. Varian (1986) : "On the private provision of public goods". *Journal of Public Economics*, Elsevier, vol. 29(1), pages 25-49.

Bianchi, S. (1990) : "America's children : Mixed prospects". *Population Bulletin*.

Binmore, K., A. Rubinstein, and A. Wolinsky (1986) : "The Nash Bargaining Solution in Economic Modelling". *The RAND Journal of Economics*, vol. 17, pp. 176-188.

Blanden, J., P. Gregg, and S. Machin (2002) : "Education and Family Income". *mimeo*.

Blundell, R., P.A. Chiappori, and C. Meghir (2005) : "Collective Labor Supply with Children". *Journal of Political Economy*, University of Chicago Press, vol. 113(6), pages 1277-1306.

Blundell R. and A. Lewbel (1991) : "The Information Content of Equivalence Scales". *Journal of Econometrics*, vol. 50, pp. 49-68.

Bougheas, S. and Y. Georgellis (1999) : "The effect of divorce costs on marriage formation and dissolution". *Journal of Population Economics*, 12(3) :489-498.

Bourdais, C., G. Neil, P. Turcotte, and al (2000) : "L'évolution des liens conjugaux". *Tendances sociales canadiennes*, 56, 15-18.

Bourguignon, F. (1984) : “Rationalité individuelle ou rationalité strategique : le cas de l’offre familiale de travail”. *Revue Economique*, 35(1), 147-62.

Bourguignon, F., M. Browning, and P.A. Chiappori (1995) : “The collective approach to household behavior”. *Working Paper 9504, DELTA*.

Bourguignon, F., M. Browning, and P.A. Chiappori (2009) : “Efficient Intra-Household Allocations and Distribution Factors : Implications and Identification”. *The Review of Economic Studies*, vol. 76 (2), pp. 503-528.

Bradley, R. H. and R. F. Corwyn (2004) : “Family Process” investments that matter for child well being. In Kalil, A. and DeLeire, T. (Eds.), *Family investments in children : Resources and parenting behaviors that promote success* (pp. 1-32). Mahwah, NJ : Erlbaum.

Brian, P., C.S. Lala, and M. C. Robert (2006) : “Advancing Age, Advantaged Youth : Parental Age and the Transmission of Resources to Children”. *Social Forces*, pp. 135990.

Brien, M. J., L. A. Lillard, and S. Stern (2006) : “Cohabitation, marriage, and divorce in a model of match quality”. *International Economic Review*, 47 (2) :451-494.

Brown, S. (2000) : “The effect of union type on psychological well-being : Depression among cohabitors versus marrieds”. *Journal of Health and Social Behavior*, 41, 241-255.

Brown, S. and A. Booth (1996) : “Cohabitation versus marriage : A comparison of relationship quality”. *Journal of Marriage and Family*, 58, 668-679.

Browning, M. (1989) : “The Effects of Children on Demand Behavior and Household Welfare”. *Unpublished Mimeo*. Mc Master University.

Browning, M., F. Bourguignon, P.A. Chiappori, and V. Lechene (1994) : "Incomes and outcomes : a structural model of intrahousehold allocation". *Journal of Political Economy*, 102(6), 1067-96.

Browning, M. and P.A. Chiappori (1998) : "Efficient intra-household allocations : a general characterization and empirical tests" *Econometrica*, 66, 1241-1278.

Browning, M., P.A. Chiappori, and V. Lechene (2010) : "Distributional Effects in Household Models : Separate Spheres and Income Pooling". *Economic Journal, Royal Economic Society*, vol. 120(545), pages 786-799, 06.

Browning, M., P.A. Chiappori, and A. Lewbel (2013) : "Estimating Consumption Economies of Scale, Adult Equivalence Scales, and Household Bargaining Power". *Review of Economic Studies*, Oxford University Press, vol. 80(4), pages 1267-1303.

Browning. M., P.A. Chiappori, and Y. Weiss (2009) : "Economics of the Family". *Cambridge Surveys of Economic Literature*.

Browning, M., A. Deaton, and M. Irish (1985) : "A Profitable Approach to Labor Supply and Commodity Demands over the Life-Cycle". *Econometrica*, Econometric Society, vol. 53(3), pages 503-43.

Bumpass, L. and K. Raley (1995) : "Single-parent families : Cohabitation and changing family reality". *Demography*, 32, 97-110.

Bumpass, L . and J. Sweet (1989) : "Children's experience in single-parent families : Implications of cohabitation and marital transitions". *Family Planning Perspectives*, 21, 256-260.

Bumpass, L. and J.A. Sweet (1995) : "Cohabitation, marriage, and union stability :

preliminary findings from NSFH2". *NSFH Working Paper No. 65.* Bumpass, L.L., J.A. Sweet, and A. Cherlin (1991) : "The role of cohabitation in declining rates of marriage". *Journal of Marriage and the Family*, 53, 913-927.

Carlson, M. and S. Danziger (1999) : "Cohabitation and the measurement of child poverty". *Review of Income and Wealth*, 45, 79-91.

Carter, M.R. and G. Katz (1997) : "Separate Spheres and the Conjugal Contract : Understanding the Gender-Biased Development". In *Intra-household Resource Allocation in Developing Countries : Models, Methods and Policy*. John Hopkins University Press.

Cazes, s. and A. B. Atkinson (1990) : "Mesures de la pauvreté et politiques sociales : une étude comparative de la France, de la RFA et du Royaume-Uni". *Revue de l'OFCE, Programme National Persée*, vol. 33(1), pages 105-130.

Chiappori, P.A. (1988) : "Rational household labor supply". *Econometrica*,56, 63-89.

Chiappori, P.A. (1992) : "Collective labor supply and welfare". *Journal of Political Economy*, 100, 437-467.

Chiappori, P.A., R. Blundell, and C. Meghir (2002) : "Collective labour supply with children". *IFS, Working Paper 02-08.*

Chiappori, P.A. and O. Donni (2004) : "Les modèles non-unitaires de comportement du ménage : un survol de la littérature". *L'Actualité Economique*, Société Canadienne de Science Economique, vol. 82(1), pages 9-52.

Chiappori, P.A. and O. Donni (2006) : "Learning from a Piece of Pie : The Empirical Content of Nash Bargaining". *IZA Discussion Papers 2128*, Institute for the Study of Labor (IZA).

Chiappori, P. A. and I. Ekeland (2006) : "The Micro Economics of Group Behavior : General Characterization ". *Journal of Economic Theory*, vol. 130(1), pp. 1-26.

Chiappori, P. A. and I. Ekeland (2009). "The Microeconomics of Efficient Group Behavior : Identification". *Econometrica,* vol. 77 (3), pp. 763-799.

Chiappori, P.A., B. Fortin, and G. Lacroix (2002) : "Marriage market, divorce legislation and household labor supply". *Journal of Political Economy*, 110, 37-72.

Chow, G. C. (1960) : "Tests of Equality Between Sets of Coefficients in Two Linear Regressions". *Econometrica*, Vol. 28, No. 3, pp. 591-605.

Christoffersen, L. B., T. S. Jensen, O. G. Pedersen, H. Keiding, and J. Munksgaard (2005) : "Evaluating sustain ability of household consumption - using DEA to assess environmental performance". *Economic Systems Research*, vol. 17, no. 4, pp. 425-447.

Couprie, H. (2004) : "L'influence du contexte institutionnel et familial sur l'offre de travail des femmes : approches microéconomiques". *Thèse de l'Université d'Aix- Marseille.*

Couprie, H. (2007) : "Time allocation within the family : welfare implications of life in a couple". *The Economic Journal.*

Daniel, K. (1992) : "Does Marriage Make Men More Productive". Economic Research Center/NORC, *Working Paper n 92-2.*

Dauphin, A., A. El Lahga, B. Fortin, and G. Lacroix(2008) : "Are Children Decision-Makers Within the Household ?". *IZA Discussion Papers 3728*, Institute for the Study of Labor (IZA).

Deaton, A. (1985) : “Panel data from time series of cross-sections”. *Journal of Econometrics* 30, 109-126. North-Holland.

Deaton, A. (1989) : “Looking for Boy-Girl Discrimination in Household Expenditure Data”. *World Bank Economic Review*, 3(1), 1-15.

Deaton, A., J. Ruiz-Castillo, and D. Thomas (1989) : “The Influence of Household Composition on Household Expenditure Patterns : Theory and Spanish Evidence”. *Journal of Political Economy*, vol. 97, pp.179-200.

Deleire, T. and A. Khalil (2005) : “How do cohabiting couples with children spend their money ?”. *Journal of Marriage and Family* 67 : 286-295.

Doisneau, L. (2002) : “Bilan demographique 2001. Le regain des naissances et des mariages se confirme”. *INSEE* ¡www.insee.fr¿.

Donni, o. (2004) : “A Collective Model of Household Behavior with Private and Public Goods : Theory and Evidence from US Data”. Econometric Society 2004 Latin American Meetings 26, *Econometric Society*.

Donni, o. (2014) : “Overinvestment in Marriage-Specific Capital”. *Mathematical social sciences*.

Dunbar, G.R., A. Lewbel, and K. Pendakur (2013) : “Children’s Resources in Collective Households : Identification, Estimation, and an Application to Child Poverty in Malawi”. *American Economic Review*, American Economic Association, vol. 103(1), pages 438-71.

Duncan, G. and W. Rodgers (1991) : “Has children’s poverty become more persistent ?”. *American Sociological Review*, 56, 538-550.

Eggebeen, D. and T. Lichter (1991). "Race, family structure, and changing poverty among American children". *American Sociological Review*, 56, 801-817.

El Lahgha, A. and N. Moreau (2007). "The effects of marriage on couples' allocation of time between market and non-market hours". *IZA Discussion paper No.2619*.

Farrell, P. and V. Fuchs (1982) : "Schooling and health : The cigarette connection". *Journal of Health Economics*, 1(3), 217-230.

Fortin B. and G. Lacroix (1997) : "A test of the neo-classical and collective models of household labor supply". *Economic Journal*, 107, 933-955.

Gale, D. and L. Shapley (1962) : "College Admission and the Stability of Marriage". *American Mathematical Monthly*, 69, pp. 9-15.

Gollier, C. (2001a) : "What Does the Classical Theory Have to Say about Portfolio Choice ?", in Luigi Guiso, Michael Haliassos and Tullio Jappelli (eds.) "*Household Portfolios*". Boston : MIT Press.

Gollier, C. (2001b) : "*The Economics of Risk and Time*". Boston : MIT Press.

Gorman, W.M. (1976) : "Tricks with Utility Functions". *Essays in Economic Analysis*, Cambridge University Press.

Gray, J. S. (1997) : "The Fall in Men's Return to Marriage : Declining Productivity Effects or Changing Selection ?". *The Journal of Human Resources* 22 :3, 481-504.

Gregg, P. and S. Machin (2000) : "The Relationship Between Childhood Experiences, Subsequent Educational Attainment and Adult Labour Market Performance", in Koen Vleminckx and Timothy Smeeding (eds.) *Child Well Being in Modern Nations : What*

do we Know ?. Policy Press.

Gronau, R. (1987) : "Home production -A survey". *Handbook of Labor Economics*, in : O. Ashenfelter and R. Layard (ed.), Handbook of Labor Economics, edition 1, volume 1, chapter 4, pages 273-304 Elsevier.

Gronau, R. (1991) : "The Intrafamily Allocation of Goods .How to Separate the Adult from the Child". *Journal of Labor Economics*, vol. 9, No. 3, pp. 207.235.

Guiso, L. and M. Paiella (2001) : "Risk Aversion, Wealth, and Background Risk". *CEPR Discussion Paper 2728*.

Haddad, L. and J. Hoddinott (1994) : "Women's Income and Boy-Girl Anthropometric Status in the Côte d'Ivoire". *World Development* 22(4), 543-553.

Haddad, L., J. Hoddinott, and T. Lloyd (1994) : "Household resource allocation in the Côte d'Ivoire : inferences from expenditure data". in T. Lloyd and O. Morrissey (eds), *Poverty, Inequality and Rural Development*, pp. 67-88.

Harbaugh, W.T, K. Krause, and L. Vesterlund (2001). "Are Adults Better Behaved Than Children ? Age, Experience, and the Endowment Effect". *Economics Letters*, 70(2) : 175181.

Hernandez, D. (1993) : "*America's children : Resources from family, government and the economy*". New York : Russell Sage Foundation.

Kannai, Y. (1977) : "Concavifiability and Constructions of Concave Utility Functions". *Journal of Mathematical Economics*, 4, 1-56.

Kenney, C. (2004) : "Cohabiting couple, filing jointly ? Resource pooling and U.S. po-

verty policies". *Family Relations*, 53, 237-247.

Kihlstrom, R. A., A. E. Roth, and D. Schmeidler (1981) : "Risk Aversion and Solutions to Nash's Bargaining Problem". In : O. Moeschlin, and D. Pellascke, eds. *Game Theory and Mathematical Economics*, Amsterdam : North Holland, 65-71.

Kimball, M.S. (1990) : "Precautionary Saving and the Marginal Propensity to Consume". *NBER Working Papers 3403*, National Bureau of Economic Research, Inc.

Kooreman, P. and A.J. Kapteyn (1990) : "On the empirical implementation of some game theoretic models of household labor supply". *Open Access publications* from Tilburg University urn :nbn :nl :ui :12-364364, Tilburg University.

Korenman, S. and D. Neumark (1992) : "Marriage, Motherhood, and Wages". *Journal of Human Resources*, 27, pp. 233-255.

Kotlikoff, L. J. and A. Spivak (1981) : "The Family as an Incomplete Annuities Market". *Journal of Political Economy*, University of Chicago Press, vol. 89(2), pages 372-91.

Krista, K. P. (2013) : "Children's Family Structure". *Center for Family and Demographic Research* in US.

Landale,N. and R. Forste (1991) : "Patterns of entry into marriage and cohabitation among mainland Puerto Rican women". *Demography*, 28, 587-608.

Lazear, E.P., and R.T. Michael (1988) : "*Allocation of Income within the Household*". Chicago : University of Chicago Press.

Lefebre, P. (2006) : "Discrimination sexuelle dans les dépenses des ménages : survol de la littérature et évidences empiriques pour le Canada ". *L'actualité économique*, vol.

82, n 1-2, 2006, p. 119-153.

Lerman, R. (2002) : "How do marriage, cohabitation, and single parenthood affect the material well being of families with children ?". *Unpublished manuscript*. Washington, DC : Urban Institute. Available at www.urban.org.

Leuthold, J.H. (1968) : "An empirical study of female income transfers and the work decision of the poor". *Journal of Human Resources*, 3, 312-23.

Lewbel, A. and K. Pendakur (2008) : "Estimation of collective household models with Engel curves". *Journal of Econometrics*, Elsevier, vol. 147(2), pages 350-358, December.

Lezzi, S. (2008) : "Investors' risk attitude and risky behavior : a bayesian approach with imperfect information". *Working paper in bank of Italy.*

Lichter,D., D. McLaughlin, G. Kephart, and D. Landry (1992) : "Race and the retreat from marriage : A short age of marriage able men ?". *American Sociological Review*, 57, 781-799.

Lindahl, E. (1919) : "Just Taxation - A Positive Solution". In R. Musgave and A. Peacock, eds., *Classics in the Theory of Public Finance*, London : MacMillan.

Lommerud, K.E. (1989) : "Marital Division of Labor with Risk of Divorce : The Role of .Voice.Enforcement Contracts". *Journal of Labor Economics*, vol. 7, pp. 113-127.

Lundberg, S. (1988) : "Labor Supply of Husbands and Wives : A Simultaneous Equations Approach " *Review of Economics and Statistics*, 70, pp. 224-235.

Lundberg, S. and R.A. Pollak (1993) : "Separate Spheres Bargaining and the Marriage Market". *Journal of Political Economy*, Vol. 101, No. 6, 988-1010.

Lundberg, S. and R.A. Pollak (1997) : "An intergenerational Model of Domestic Violence". *Unpublished paper*, University of Washington.

Lundberg, S. J., R. A. Pollak, and T. J. Wales (1997) : "Do Husbands and Wives Pool Their Resources ? Evidence from the United Kingdom Child Benefit". *Journal of Human Resources*, University of Wisconsin Press, vol. 32(3), pages 463-480.

Lundberg, S. and E. Rose (2002) : "The effects of sons and daughters on men's labor supply and wages". *The Review of Economic and Statistics* 84 :2, 251-268.

Lundberg, S. and E. Rose (2003) : "Child gender and the transition to marriage". *Demography*, Springer, vol. 40(2), pages 333-349.

Lyigun, M. (2009) : "Marriage, Cohabitation and Commitment". *IZA Discussion Papers 4341*, Institute for the Study of Labor (IZA).

Manning, W. (1994) : "To marry or to cohabit ? The role of socioeconomic disadvantage". *Paper presented at the annual meeting of the Population Association of America*, Los Angeles, CA.

Manning, W. and P. Smock (1995) : "Why marry ? Race and the transition to marriage among cohabitors". *Demography*, 32, 509-520.

Manser, M. and M. Brown (1980) : "Marriage and Household Decision-Making : A Bargaining Analysis". *International Economic Review*, Vol. 21, No. 1, 31-44.

Mark, L. (2006) : "Expenditures on Children by Families". *Miscellaneous Publication* No. 1528-2006 (U.S. Department of Agriculture, Center for Nutrition Policy and Promotion, 2007.

Matouschek, N. and I. Rasul (2008) : "The economics of the marriage contract : Theories and evidence". *Journal of Law and Economics*, 51(1) :59110.

McElroy, M. B. (1990) : "The empirical content of Nash bargained household behavior". *Journal of Human Resources*, 25(4), 559-83.

McElroy, M. B. and M.J. Horney (1981) : "Nash-Bargained Household Decisions : Toward a Generalization of the Theory of Demand". *International Economic Review*, Vol. 22, No. 2, 333-349.

McInish, T. H., S. N. Ramaswami, and R. K. Srivastava (1993) : "Do more risk-averse investors have lower net worth and income ?". *The Financial Review*, 28 (1), 91-106.

Merton, R. C. (1969) : "Lifetime Portfolio Selection under Uncertainty. The Continuous-Time Case". *Review of Economics and Statistics*, 3, 247-257.

Milan, A. (2000) : "Les familles : 100 ans de continuité et de changement". *Tendances sociales canadiennes*, 56, 2-13.

Munksgaard, J., M. Wier, M. Lenzen, and C. Dey (2005) : "Using input-output analysis to measure the environmental pressure of consumption at different spatial levels". *Journal of Industrial Ecology*, vol. 9, no 1-2, pp. 169-186.

Nash, J. F. (1950) : "The Bargaining Problem". *Econometrica*, Econometric Society, vol. 18(2), pages 155-162, April.

Nash, J. F. (1951) : "Non-cooperative games". *Annals of Mathematics*, 54, 286-295.

Nash, J. F. (1953) : "Two persons cooperative games". *Econometrica*, 21, 128-140.

Nordblom, K. (2004) : "Cohabitation and Marriage in a Risky World". *Review of Economics of the Household* 2, 325-340.

Omori, M. (2010) : "Household expenditure on children". *Monthly Labor Review.*

Oppenheimer, V. (1988) : "A theory of marriage timing". *American Journal of Sociology*, 94, 563-591.

Oropesa, R., N. Landale, and T. Kenkre (2003) : "Income allocation in marital and cohabiting unions : The case of mainland Puerto Ricans". *Journal of Marriage and Family*, 65, 910-926.

Pollak, R. A. (1994) : "For Better or Worse : The Roles of Power in Models of Distribution within Marriage". *American Economic Review*, American Economic Association, vol. 84(2), pages 148-52, May.

Raley, K. (1993) : "Black-White differences in union formation". *Paper presented at the annual meeting of the Southern Demographic Association*, New Orleans L, A.

Rasul, I. (2005) : "The impact of divorce laws on marriage". *Unpublished manuscript*, University of Chicago.

Rosenzweig, M. and O. Stark (1989) : "Consumption Smoothing, Migration, and Marriage : Evidence from Rural India". *Journal of Political Economy*, 97, pp. 905-926.

Roth, A. E. (1979) : "*Axiomatic Models of Bargaining*". Berlin : Springer.

Rothbarth, E. (1943) : "Note on a method of determining equivalent income for families of different composition". In Madge C. (Ed.), *War time pattern of saving and spending*, Cambridge University press, Appendix 4, 123-130.

Sahib, P. R. and G. Xinhua (2002) : "To Tie the Knot or Not : Cohabitation, Marriage, and Individual' Attitudes to Risk". *Demographic Research* 6(13) : 355-381.

Samuelson, P.A. (1956) : "Social indifference curves". *Quaterly Journal of Economics*, 70, 1-22.

Samuelson, P. A. (1964) : "Tax Deductibility of Economic Depreciation to Insure Invariant Valuations". *Journal of Political Economy*, University of Chicago Press, vol. 72, pages 604.

Samuelson, P. A. (1969) : "Lifetime Portfolio Selection by Dynamic Stochastic Programming". *Review of Economics and Statistics*, 3, 239-246.

Schoen, R. and R. Weinick (1993) : "Partner choice in marriages and cohabitations". *Journal of Marriage and the Family*, 55, 408-414.

Seltzer, J. (2000) : "Families formed outside of marriage". *Journal of Marriage and Family*, 62, 1247-1268.

Seltzer, J. A. (2004) : "Cohabitation in the United States and Britain : Demography, Kinship, and the Future". *Journal of Marriage and Family* 66 :921-29.

Sen, A. (1990) : "Gender and Cooperative Conflicts ". in I. Tinker (ed.), Persistent Inequalities : *Women and World Development*, New York, Oxford University Press, pp. 123-149.

Silber, J. (1981) : "La théorie économique des ménages et l'étude des phénomènes démographiques". In : *Population*, 36e année, n3, 1981 pp. 557-575.

Sobel, J. (1981) : "Distortion of Utilities and the Bargaining Problem". *Econometrica*,

49, 597-620.

Spivey, C. (2006) : "Desperation or Desire ? The Role of Risk Aversion in Marriage". *Econ Inquiry*. 2010 ;48(2) :499-516.

Stock, J.H. and M.W. Watson (2011) : "*Introduction to Econometrics*". Third edition. Global edition. Pearson.

Stratton, L. S. (2005) : "The Degree of Intra household Specialization in House work and How Specialization Varies Across Couple Households". *Paper presented at the SOLE Meetings*.

Thomas, D. (1993) : "The distribution of income and expenditure within the household". *Annales d'Economie et de Statistiques*, n29, pp.109-135.

Thornton, A., W. Axinn, and J. Teachman (1995) : "The influence of school enrollment and accumulation on cohabitation and marriage in early adulthood". *American Sociological Review*, 60, 762-774.

Tsakloglou, P. (1991) : "Estimation and Comparison of Two Simple Models of Equivalence Scales for the Cost of Children". *The Economic Journal*, vol. 101, No. 405, pp. 343-357.

Turner, K., M. Lenzen, T. Wiedmann, and J. Barrett (2007) : "Examining the global environmental impact of regional consumption activities - Part1 : A technical note on combining input-output and ecological footprint analysis", *Ecological Economics*, vol. 62, no. 1, pp. 37-44.

Ulph, D. (1988) : "A general non cooperative Nash model of household consumption behavior".*Discussion Paper*. University of Bristol, U.K.

Verbeek, M.J.C.M. and T.E. Nijman (1992) : "Minimum MSE estimation of a regression model with fixed effects from a series of cross sections (Revised version)". *Discussion Paper1992-1*, Tilburg University, Center for Economic Research.

Vermeulen, F. (2002) : "Collective household models : pinciples and main results". *Journal of Economic Surveys*, 16(4), 533-564.

Vesterlund, L. (1997) : "The Effects of Risk Aversion on Job Matching : Can Differences in Risk Aversion Explain the Wage Gap ?". *Unpublished manuscript*, Department of Economics, University of Pittsburgh.

Waite, L., and M. Gallagher (2000) : "*The case for marriage*". New York : Broadway Books.

Weiss, Y. (1994) : "Les économistes et la formation des couples. Le fonctionnement du mariage et du marché matrimonial". *Population* (french edition), Institut National d'études Démographiques (INED), vol. 49, pages 1015-1039.

Weiss, Y. and R. Willis (1997) : "Match quality, new Information and Marital Dissolution". *Journal of Labor Economics*, vol. 15, pp. S293-329.

White, L.(2008) : "Prudence in bargaining : The effect of uncertainty on bargaining outcomes". *Games and Economic Behavior*, Vol 62, Issue 1, January, Pages 211.231.

Winkler,A. (1993) : "The living arrangements of single mothers with dependent children : An added perspective". *The American Journal of Economics and Sociology*, 52, 1-18.

Woolley, F.R. (1988) : "A non-cooperative Nash model of family decision-making". London School of Economics, *working paper n TIDI/125*.

Wu, Z. (1999) : “Premarital cohabitation and the timing of first marriage”. *Canadian Review of Sociology and Anthropology*, 36, 109-127.

Wydick, B. (2007) : “Grandma was right : Why cohabitation undermines relational satisfaction, but is increasing anyway”. *Kyklos*, 60(4) :617645.

Yurko, A. (2014) : “Costly divorce and marriage rates”. *Working paper*, International College of Economics and Finance. NRU Higher School of Economics.

Appendices

APPENDIX A : Risk attitude and marital status

1. Propensity to marry and bargaining risk

1.1 Propensity to marry's expression

Let PM^B be the propensity to marry of spouse i confronted to bargaining risk, as follows :

$$PM^B = E(U_2^M/k^M) - E(U_2^C/k^C)$$

$$= \frac{1}{\Sigma}[u(\frac{Y_2}{2})(\int_{Y_2-y_M^*}^{y_M^*} f(t).dt - \int_{Y_2-y_C^*}^{y_C^*} f(t).dt) + (\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} u(\eta^M(t))f(t).dt - \int_{y_C^*}^{\frac{Y_2+\Sigma}{2}} u(\eta^C(t))f(t).dt) +$$

$$(\int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_M^*} u(Y_2-\eta^M(t))f(t).dt - \int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_C^*} u(Y_2-\eta^C(t))f(t).dt)]$$

Defining $t^{'} = Y_2 - t$ and using a convenient change of variable for the two last integrals, the propensity to marriage become

$$PM^B = \frac{1}{\Sigma}[u(\frac{Y_2}{2})(\int_{Y_2-y_M^*}^{y_M^*} f(t).dt - \int_{Y_2-y_C^*}^{y_C^*} f(t).dt) + (\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} (u(\eta^M(t)) + u(Y_2-\eta^M(t)))f(t).dt$$

$$- \int_{y_C^*}^{\frac{Y_2+\Sigma}{2}} (u(\eta^C(t)) + u(Y_2-\eta^C(t)))f(t).dt)$$

then,

$$PM^B = \frac{1}{\Sigma}[u(\frac{Y_2}{2})(\int_{Y_2-y_M^*}^{y_M^*} f(t).dt - \int_{Y_2-y_C^*}^{y_C^*} f(t).dt) + u(Y_2)(\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} f(t).dt - \int_{y_C^*}^{\frac{Y_2+\Sigma}{2}} f(t).dt)]$$

1.2 Propensity to marry and divorce cost

The derivative of the propensity to marry with respect to divorce cost is defined as :

$$\frac{\partial PM^B}{\partial k^M} = \frac{\partial E(U_2^M/k^M)}{\partial k^M} - \frac{\partial E(U_2^C/k^C)}{\partial k^M}$$

$$= \frac{\partial E(U_2^M/k^M)}{\partial k^M} + 0$$

or expected utility function for a married spouse i is defined as :

$$E(U_2^M/k^M) = \frac{1}{\Sigma}[u(\frac{Y_2}{2}) \int_{Y_2-y_M^*}^{y_M^*} f(t).dt + \int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} u(\eta^M(t)) f(t).dt +$$

$$\int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_M^*} u(Y_2 - \eta^M(t)) f(t).dt] + \theta$$

$$= \frac{1}{\Sigma}[I(k^M) + J(k^M) + L(k^M)] + \theta$$

thus,

$$\frac{\partial E(U_2^M/k^M)}{\partial k^M} = \frac{1}{\Sigma}[\frac{\partial I(k^M)}{\partial k^M} + \frac{\partial J(k^M)}{\partial k^M} + + \frac{\partial L(k^M)}{\partial k^M}] + 0$$

The first part of this expression is

$$\frac{\partial I(k^M)}{\partial k^M} = u(\frac{Y_2}{2}) \times [\frac{\partial y_M^*(k^M)}{\partial k^M}.f(y_M^*) - \frac{\partial (Y_2 - y_M^*)}{\partial k^M}.f(Y_2 - y_M^*)]$$

$$= u(\frac{Y_2}{2}) \times [\frac{\partial y_M^*}{\partial k^M}.f(y_M^*) + \frac{\partial y_M^*}{\partial k^M}.f(Y_2 - y_M^*)]$$

The second part is equal to

$$\frac{\partial J(k^M)}{\partial k^M} = -[u(\eta^M(k^M, y_M^*)).f(y_M^*)].\frac{\partial y_M^*}{\partial k^M} + \int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} \frac{\partial u(\eta^M(k^M))}{\partial k^M}.f(t).dt$$

$$= -[u(\frac{Y_2}{2}).f(y_M^*)].\frac{\partial y_M^*}{\partial k^M} + \int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} u^{'}(\eta^M)\frac{\partial \eta^M(k^M)}{\partial k^M}.f(t).dt$$

and finally the third part is

$$\frac{\partial L(k^M)}{\partial k^M} = -[u(Y_2 - \eta^M(Y_2 - y_M^*)).f(Y_2 - y_M^*)].\frac{\partial y_M^*}{\partial k^M} + \int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_M^*} \frac{\partial u(Y_2 - \eta^M)}{\partial k^M}.f(t).dt$$

$$= -[u(\frac{Y_2}{2}).f(Y_2 - y_M^*)].\frac{\partial y_M^*}{\partial k^M} - \int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_M^*} u^{'}(Y_2 - \eta^M)\frac{\partial \eta^M}{\partial k^M}.f(t).dt$$

then, the marginal utility function for spouse i can be written as

$$\frac{\partial E(U_2^M/k^M)}{\partial k^M} = \frac{1}{\Sigma}.[\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} u^{'}(\eta^M)\frac{\partial \eta^M(k^M)}{\partial k^M}.f(t).dt - \int_{\frac{Y_2-\Sigma}{2}}^{Y_2-y_M^*} u^{'}(Y_2 - \eta^M)\frac{\partial \eta^M}{\partial k^M}.f(t).dt]$$

Defining $t^{'} = Y_2 - t$ and using a convenient change of variable, the marginal utility function become

$$\frac{\partial E(U_2^M/k^M)}{\partial k^M} = \frac{1}{\Sigma}.[\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} u^{'}(\eta)\frac{\partial \eta(k^M)}{\partial k^M}.f(t).dt - \int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} u^{'}(Y_2 - \eta^M)\frac{\partial \eta^M}{\partial k^M}.f(t).dt]$$

$$= \frac{1}{\sum}.[\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} \frac{\partial \eta^M(k^M)}{\partial k^M}.[u^{'}(\eta^M) - u^{'}(Y_2 - \eta^M)]f(t)dt]$$

then, using equation (2.7) implies that

$$\frac{\partial \eta^M(k^M)}{\partial k^M} = -\frac{1}{u^{'}(\eta^M)}$$

thus, the marginal utility function can be written as

$$\frac{\partial E(U_2^M/k^M)}{\partial k^M} = -\frac{1}{\sum}.[\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} .[1 - \frac{u^{'}(Y_2 - \eta^M)}{u^{'}(\eta^M)}]f(t)dt]$$

2. Propensity to marry and divorce risk

2.1 The conditional expected utility

The conditional utility function is defined as :

$$E(V_2/k) = E(V_2/k, D = 1) \times Pr(D = 1/k) + E(V_2/k, D = 0) \times Pr(D = 0/k)$$

where ;

$$E(V_2/k, D=0) = \frac{\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}} E(U_2/\theta + \Omega\nu + k)\varphi(\nu)d\nu}{\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}} \varphi(\nu)d\nu}$$

and

$$E(V_2/k, D=1) = \int_{-\frac{1}{2}}^{+\frac{1}{2}} u(\frac{Y_2}{2} + \Sigma\varepsilon).\phi(\varepsilon).d\varepsilon - k$$

thus if we replace every term by its expression, we shall have

$$E(V_2/k) = [\int_{-\frac{1}{2}}^{+\frac{1}{2}} u(\frac{Y_2}{2} + \Sigma\varepsilon).\phi(\varepsilon).d\varepsilon - k] \times \int_{-\frac{1}{2}}^{-\frac{(\theta+k)}{\Omega}} \varphi(\nu)d\nu +$$

$$[\frac{\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}} E(U_2/\theta + \Omega\nu + k)\varphi(\nu)d\nu}{\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}} \varphi(\nu)d\nu}] \times \int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}} \varphi(\nu)d\nu$$

$$= [\int_{-\frac{1}{2}}^{+\frac{1}{2}} u(\frac{Y_2}{2} + \Sigma\varepsilon).\phi(\varepsilon).d\varepsilon - k] \times \int_{-\frac{1}{2}}^{-\frac{(\theta+k)}{\Omega}} \varphi(\nu)d\nu +$$

$$[\int_{-\frac{(\theta+k)}{\Omega}}^{+\frac{1}{2}} E(U_2/\theta + \Omega\nu + k)\varphi(\nu)d\nu]$$

2.2 Propensity to marry and divorce cost

If married spouses run the risk of divorce, the expected utility function is defined as :

$$E(V_2^M/k^M) = [\int_{-\frac{1}{2}}^{+\frac{1}{2}} u(\frac{Y_2}{2} + \Sigma\varepsilon).\phi(\varepsilon).d\varepsilon - k^M] \times \int_{-\frac{1}{2}}^{-\frac{(\theta+k^M)}{\Omega}} \varphi(\nu)d\nu +$$

$$[\int_{-\frac{(\theta+k^M)}{\Omega}}^{+\frac{1}{2}} E(U_2/\theta + \Omega\nu, k^M)\varphi(\nu)d\nu]$$

Using the above equation, and applying the Leibniz rule, the derivative of this equation with respect to k^M can be written as

$$\frac{\partial E(V_2/k^M)}{\partial k^M} = -\int_{-\frac{1}{2}}^{-\frac{(\theta+k^M)}{\Omega}} \varphi(\nu)d\nu + [\int_{-\frac{1}{2}}^{+\frac{1}{2}} u(\frac{Y_2}{2} + \Sigma\varepsilon).\phi(\varepsilon).d\varepsilon - k^M] \times [\varphi(-\frac{(\theta+k^M)}{\Omega}).(-\frac{1}{\Omega})] +$$

$$[(E(U_2/\theta + \Omega\nu, k^M, \nu = -\frac{(\theta+k^M)}{\Omega}).\varphi(-\frac{(\theta+k^M)}{\Omega}).\frac{1}{\Omega} + \int_{-\frac{(\theta+k^M)}{\Omega}}^{+\frac{1}{2}} .\frac{\partial E(U_2/\theta + \Omega\nu, k^M)}{\partial k^M}.\varphi(\nu)]$$

$$= -\int_{-\frac{1}{2}}^{-\frac{(\theta+k^M)}{\Omega}} \varphi(\nu)d\nu - \frac{1}{\Omega}.\varphi(-\frac{(\theta+k^M)}{\Omega}).[\int_{-\frac{1}{2}}^{+\frac{1}{2}} u(\frac{Y_2}{2}+\Sigma\varepsilon).\phi(\varepsilon).d\varepsilon - k^M]+$$

$$\frac{1}{\Omega}.\varphi(-\frac{(\theta+k^M)}{\Omega}).(E(U_2/\theta+\Omega\nu, k^M, \nu = -\frac{(\theta+k^M)}{\Omega})+\int_{-\frac{(\theta+k^M)}{\Omega}}^{+\frac{1}{2}} .\frac{\partial E(U_2/\theta+\Omega\nu, k^M)}{\partial k^M}.\varphi(\nu)$$

or using **APPENDIX A** we have

$$\frac{\partial E(U_2^M/k)}{\partial k^M} = \frac{1}{\sum}.[\int_{y_M^*}^{\frac{Y_2+\Sigma}{2}} \frac{\partial \eta(k)}{\partial k^M}.[u^{'}(\eta^M) - u^{'}(Y_2-\eta^M)]f(t)dt]$$

For a random term equal to $\nu = -\frac{(\theta+k^M)}{\Omega}$, two important results will be associated : (i) spouses would be indifferent between divorce and remaining in couple : $E(V_2^M/k^M, D = 1) = E(V_2^M/k^M, D = 0)$. (ii) Indeed, in the case that spouses remain together, the level of utility of every spouse during the second period coincides with his level of utility without divorce risk : $E(V_2^M/k^M, D = 0) = E(U_2^M/k^M)$.Then, the marginal utility function with respect to divorce cost can be written as

$$\frac{\partial E(V_2^M/k^M)}{\partial k^M} = -\int_{-\frac{1}{2}}^{-\frac{(\theta+k^M)}{\Omega}} \varphi(\nu)d\nu+\frac{1}{\sum}\int_{-\frac{(\theta+k^M)}{\Omega}}^{+\frac{1}{2}}[\int_{y-M^*}^{\frac{Y_2+\Sigma}{2}} \frac{\partial \eta^M(k^M)}{\partial k^M}.[u^{'}(\eta^M)-u^{'}(Y_2-\eta^M)]$$

$$f(t)dt].\varphi(\nu)d\nu$$

APPENDIX B : Children's cost in collective households : theory and empirical evidence from the UK

1. Construction of the aggregate good

The shadow price of the aggregate good is determined by the publicness of the goods that compose it. To illustrate this, suppose that each individual i is characterized by

the following separable utility functions :

$$u_i = u_i(x_i, \nu_i(\overline{\boldsymbol{X}})),$$

with $i = w, m$, where $\overline{\boldsymbol{X}} = (\overline{X}_1, \ldots, \overline{X}_T)'$ is a vector of non-exclusive goods, and ν_i is a sub-utility function which is homothetic (Blackorby, Lady, Nissen, Russell, 1970). In the case of a single individual, the optimization problem is the following :

$$\max u_i(x_i, \nu_i(\overline{\boldsymbol{X}}))$$

subject to

$$x_i p_i + \overline{\boldsymbol{X}}' \boldsymbol{P} = y_i$$

where $\boldsymbol{P} = (P_1, \ldots, P_T)'$ is a vector of prices. The optimization problem can be seen as a two-step optimization problem. In the first step, the sub-utility function ν_i is maximized :

$$\max_{\{\overline{\boldsymbol{X}}\}} \nu_i(\overline{\boldsymbol{X}})$$

subject to

$$\overline{\boldsymbol{X}}' \boldsymbol{P} = b_i$$

where b_i is the income budget devoted to $\overline{\boldsymbol{X}}$ and the solutions are $\overline{\boldsymbol{X}}_i = \overline{\boldsymbol{X}}(\boldsymbol{P}, b_i)$. The optimization problem defines the indirect sub-utility function. Using a convenient cardinalization, it has the following form :

$$\nu_i(\overline{\boldsymbol{X}}(\boldsymbol{P}_i, b_i)) = \frac{b_i}{r_i(\boldsymbol{P}_i)},$$

because of the property of homothecity, where the function $r_i(\boldsymbol{P}_i)$ is linearly homogeneous. In the second step, the total utility function $u_i(x_i, \nu_i)$ is maximized with respect to x_i and ν_i, that is,

$$\max_{\{x_i, \nu_i\}} u_i(x_i, \nu_i)$$

subject to

$$x_i p_i + \nu_i r_i(\boldsymbol{P}_i) = y_i$$

where $\nu_i = X_i$ is the aggregate good. The solution for the exclusive good can thus be written as :

$$x_i = g_i\left(\frac{p_i}{r_i}, \frac{y_i}{r_i}\right).$$

In the case of a couple household, a consumption technology that characterizes the jointness or publicness of goods and a sharing rule that defines the relative allocation of household resources among the household members have to be used. Following Browning et al. (2013), the prices of the remaining goods are supposed to change according to a vector of scales :

$$\boldsymbol{P}^* = \boldsymbol{a}_i \otimes \boldsymbol{P}$$

where $\otimes$ is the Hadamard (i.e., element-by-element) product and $\boldsymbol{a}_i = (a_{i,1}, \ldots, a_{i,T})'$ is a vector of constants, so that the price of the aggregate good is $r_i = r_i(\boldsymbol{P}^*)$. For instance, suppose that

$$r_i(\boldsymbol{P}) = \prod_{t=1}^{T} P_t^{\lambda_t}$$

with $\sum_{t=1}^{T} \lambda_t = 1$. In that case, $A_i = \prod_{t=1}^{T} a_{i,t}^{\lambda_t}$ is simply a geometric mean of the good-specific scales $\boldsymbol{a}_i$.

2. Identification : complementary results

1. We consider that $h = 2$. The condition

$$A_{2,w} G_w + A_{2,m} G_m = y$$

must hold for any value y and y'. In particular, we have :

$$A_{2,w} G'_w + A_{2,m} G'_m = y' \tag{5.1}$$

where $G'_w = G_w(\bar{p}_w / A_{2,w}, \omega'_w)$ and $G'_m = G_m(\bar{p}_m / A_{2,m}, \omega'_m)$ for some values ω'_w and ω'_m (i.e., determined by the selected value y' since prices are taken as constants). Supposing that $G_m G'_w - G'_m G_w \neq 0$ and solving the system with respect to $A_{2,w}$ and $A_{2,m}$ give :

$$A_2 = F_2\left(A_2, y, y'\right)$$

where

$$A_2 = \begin{pmatrix} A_{2,m} \\ A_{2,w} \end{pmatrix}, \qquad F_2(A_2, y, y') = \begin{pmatrix} \dfrac{y' G_w - y G'_w}{G'_m G_w - G_m G'_w} \\ \dfrac{y G'_m - y' G_m}{G_w G'_m - G'_w G_m} \end{pmatrix}.$$

The function F_2 is known because G_w, G_m, G'_w and G'_m are known. The condition $G_m G'_w - G'_m G_w \neq 0$ is satisfied if budget share equations are non-linear, with a different slope (a typical condition used in this literature for identification purposes that does not imply that budget share functions are differentiable). Then the system above uniquely defines A_2 only if there is no $K = (K_m, K_w)'$ such that

$$A_2 + K = F_2\left(A_2 + K, y, y'\right)$$

for any y and y'. This will be the case if (a) $F_2\left(A_2, y, y'\right)$ is independent of y and y' and $F_2\left(A_2, y, y'\right)$ is a contraction vis-à-vis its first argument and/or (b) $F_2(A_2, y, y')$ is dependent of y and y'.

2. We consider that $h = 3$. Similarly, the condition

$$A_{3,i} G_i = K_i \phi_{2,i}$$

and

$$A_{3,i} G'_i = K_i \phi'_{2,i}$$

must hold for any value y and $y^{'}$ and $i = m, w$. Therefore, if K_i is eliminated, the system becomes :

$$A_3 = F_3(A_3, y, y')$$

where

$$A_3 = \begin{pmatrix} A_{3,m} \\ A_{3,w} \end{pmatrix}, \qquad F_3(A_3, y, y') = \begin{pmatrix} G'_m/G_m - \phi'_{2,m}/\phi_{2,m} \\ G'_w/G_w - \phi'_{2,w}/\phi_{2,w} \end{pmatrix}$$

The function $F_3(A_3, y, y')$ is known. This equation has a unique solution if (a) $F_3\left(A_3, y, y'\right)$ is independent of y and y' and $F_3\left(A_3, y, y'\right)$ is a contraction vis-à-vis its first argument and/or (b) $F_3(A_3, y, y')$ is dependent of y and y'.

3. The approximated individual shares

The woman's share of total expenditure is :

$$\begin{aligned}\phi_{h,w} &= \frac{\exp(a + b\log y)}{1+\exp(a+b\log y)} \times \exp(c_w n) \\ &= \frac{\exp(\eta)}{1+\exp(\eta)} \times \exp(\vartheta_w).\end{aligned}$$

The first order Taylor approximation computed at $\eta = 0$ and $\vartheta_w = 0$ is :

$$\phi_{h,w} \simeq \frac{1}{2} \times \left[1 + \frac{\eta}{2} + \vartheta\right]$$

similarly,

$$\phi_{h,m} = \frac{1}{1+\exp(\eta)} \times \exp(\vartheta_m).$$

hence :

$$\phi_{h,m} \simeq \frac{1}{2} \times \left[1 - \frac{\eta}{2} + \vartheta\right].$$

Then using a traditional approximation for the log function gives :

$$\log \phi_{h,w} \simeq \log \frac{1}{2} + \frac{\eta}{2} + \vartheta$$

and

$$\log \phi_{h,m} \simeq \log \frac{1}{2} - \frac{\eta}{2} + \vartheta.$$